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REPORT ON THE IMMEDIATE WATER POLLUTION CONTROL NEEDS FOR THE INTERSTATE AND INTRASTATE WATERS OF THE NEW JERSEY COASTAL REGION

Federal Water Pollution Control Administration
Metuchen, New Jersey

June 1967

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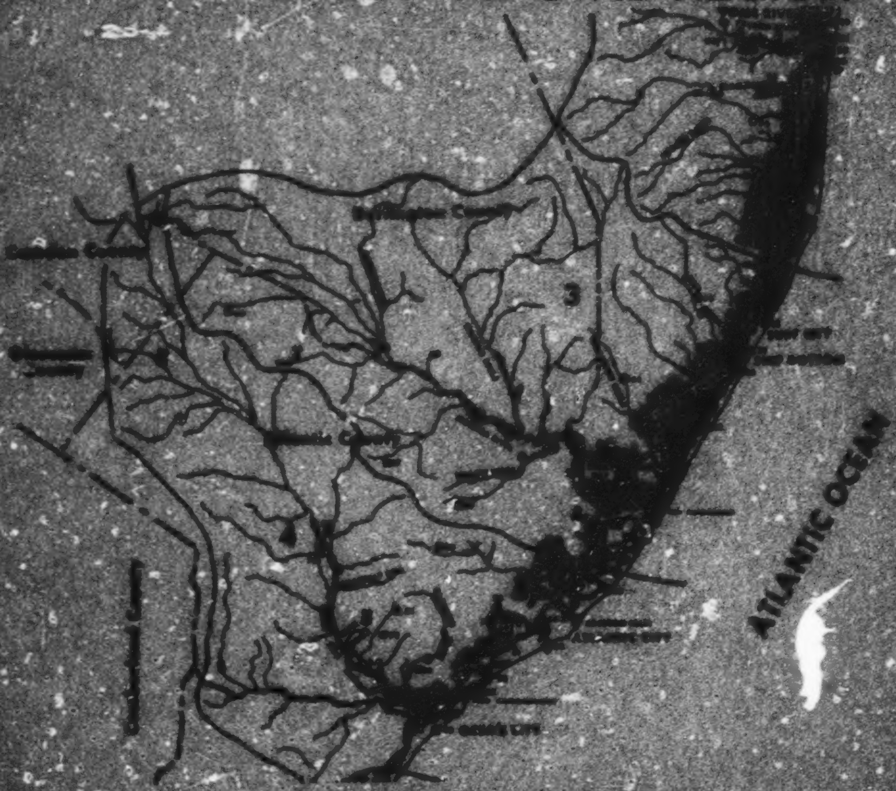

U. S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
HUDSON-CHAMPLAIN AND METROPOLITAN COASTAL
COMPREHENSIVE WATER POLLUTION CONTROL PROJECT
Metuchen, New Jersey
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ERRATA SHEET

November 7, 1967

for

Report on Immediate Water Pollution Control Needs
Interstate and Intrastate Waters
New Jersey Coastal Region, June, 1967

Page or Table Number	Correction
Page III-1	Fourth paragraph, add after the last sentence, the following: "This load emanates from the Toms River Chemical Corp. (See text and footnote e, Table III-2 for a description of the needed abatement action). This need was classified as a Priority IV action. Since corrective action need not involve construction it was not included in tables dealing with need by type of construction activity.
Page III-2	Add the following paragraph after paragraph three, "One industrial facility, Toms River Chemical Corp. presently combines its domestic wastes (from 1,000 employees) after primary treatment with its industrial wastes which are equivalent to a population of 19,000 persons. There is a need for adequate monitoring of the outfall from this plant to ensure prevention of damage to recreational beaches. This need was assigned to Priority IV.
Table III-5, Page III-14	Revise footnote d to read, "Estimated cost for ancillary work (interceptors, outfalls, pumping stations, etc.) = (Estimated cost of plant) x (.83)."
Table III-9, Page III-18	Revise footnote c to read, "Estimated cost for ancillary work (interceptors, outfalls, pumping stations, etc.) = (Estimated cost of plant) x (.83)."
Page VI-5	Delete paragraph describing, "Recreational and Commercial Navigation." See reverse page for corrected version.
Table VI-2A, Page VI-15	Delete Berlin Boro from Table. Add Dennis Township, New Jersey Highway Authority to Table, data for this facility is included under Table VI-3. Population totals and cost estimates will change accordingly.
Table VI-3, Page VI-20	Delete Dennis Township, New Jersey Highway Authority from Table. Add Berlin Boro to Table, data for this facility is included under Table VI-2A. Population totals and cost estimates will change accordingly.

(Errata Sheet, Cont'd)

Recreational and Commercial Navigation

Recreational and commercial navigation are important water uses throughout the New Jersey Coastal Region. Recreational boating constitutes an adverse source of pollution because of the discharge of human fecal matter, litter, motor exhaust and oil. The discharge of untreated human feces from watercraft in the Region represents a significant health hazard, one which is particularly acute in crowded marinas. The State of New Jersey has regulations governing the disposal of wastewater from watercraft, however, these regulations do not apply in tidal waters.

The rapid growth of pleasure boating has resulted in an appreciable increase in dumping of litter, including such materials as plastic food wrap, and glass, metal and cardboard containers. These materials do not readily disintegrate. Some may flow onto the beaches resulting in the deterioration of the aesthetic quality of the environment.

The exhaust from outboard and certain inboard motors is discharged directly into the water, resulting in contamination by hydrocarbon residues. In restricted waters, such as the numerous lagoons, coves and inlets found throughout the intracoastal waters of the Region, the concentration of these residues may reach levels detrimental to aquatic life.

Oil pollution can occur as a result of careless operation of recreational boats, but due to the volume of oil involved, this phase of the problem is usually limited to restricted waters where large numbers of boats are concentrated, such as marinas. The spillage of oil by commercial traffic may also contribute to the problem of oil pollution. These spills, resulting from pumping of bilges or from damaged tankers and barges, can cover large areas with sticky oil residue, making shore and waters unsuitable for recreation. At the present time this problem is largely confined to the ocean shoreline. (Above replaces text on page VI-5).

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I - INTRODUCTION

The

This report reviews the water pollution problem in the New Jersey Coastal Region, which extends from Sandy Hook to Cape May and includes those streams draining eastward to the Atlantic Ocean, the various bays and harbors, and the immediate Coastal waters. The Region lies entirely within the State of New Jersey. The discharge of waste from municipalities and numerous other sources degrades water quality and prevents full utilization of this natural resource throughtout the Region.

The purpose of this report is to delineate those actions which should be undertaken immediately to prevent further degradation of these waters. Such actions include not only construction of new or improved municipal and industrial waste treatment facilities, but also those studies, surveys and research which must be completed prior to development of sound water quality management programs for the future.

The recommendations included in this report are based on existing data, known to be inadequate in certain cases. These data, obtained from published documents, from State agency files, and from the files of the Federal Water Pollution Control Administration indicate the need for additional studies to augment available information. Using the available data, and a scoring procedure described in the Appendix, the needed construction activities were determined in order of priority of urgency.

This report has been prepared under the authority of the provisions of the Federal Water Pollution Control Act, as amended, and in accordance with Presidential Executive Order 11288, "Prevention, Control and Abatement of Water Pollution by Federal Activities."

II - SUMMARY AND CONCLUSIONS

1. This report covers the New Jersey Coastal Region, which extends from Sandy Hook to Cape May and includes those streams draining eastward to the Atlantic Ocean, the various bays and harbors, and the immediate Coastal waters. As a result of man and his activities, water pollution is a problem on nearly all of the bodies of water within the Region.

2. The governmental agency within the Region which has direct responsibility for water pollution control is the New Jersey State Department of Health. Assistance and/or coordination is provided by the Federal Water Pollution Control Administration.

3. Pollution of these waters not only presents a hazard to the health of persons using them for water supply and water contact recreation, but also restricts full utilization for fish and wildlife, industrial and agricultural needs, and presents an unsightly and objectionable appearance. Such degradation can result in deterioration of much of the regional economy, which is based in large part on recreation and similar water based activities.

4. The major sources of pollution of these waters are inadequately treated municipal and industrial wastes. There are 74 known municipal and Federal waste discharges and one industrial source of waste which affect interstate or intrastate waters and which require pollution abatement action.

5. The interstate waters of the Region are affected by the discharge of inadequately treated wastes from 67 municipalities and/or institutions, three Federal facilities, and one industry. Twenty-five municipalities and institutions have primary plants which are obsolete although all provide some degree of treatment.

6. There are a total of four municipal and/or institutional sources which affect only intrastate water within the Region. All four are intermediate plants suitable for upgrading.

7. To achieve satisfactory water quality, all municipal and industrial waste sources should receive a minimum of secondary treatment which is defined as 90 percent BOD removal and 95 percent removal of suspended solids. In addition, all municipal wastes should receive effective disinfection. In certain cases, removal of nutrients and of toxic materials are required in addition to the above. These criteria served as guidelines to determine immediate construction needs and to calculate cost estimates for this report.

8. The estimated cost to abate the pollution of the interstate waters is presented in Table II-1 and totals $137,600,000.

9. The estimated cost to abate the pollution of the intrastate waters is presented in Table II-2, and totals $829,000.

10. In addition to the waste discharges from municipalities and industries, water quality within the Region is degraded to an unknown degree by wastes from such sources as individual septic tanks and cesspools, combined sewers and urban runoff, recreational and commercial boating, salt intrusion, agricultural runoff, and heat from power plants and industries. The problem is further complicated by lack of adequate circulation and mixing in many of the protected tidal areas.

11. To make possible the control of pollution from these sources, and to ensure that the funds expended for immediate construction activity result in improvement of water quality, additional legislation, studies and planning will be required.

12. The State of New Jersey should adopt, revise and implement laws that will:

a. Prohibit dumping of litter and disposal of untreated waste from watercraft into the tidal waters;

b. Provide for effective operation and maintenance of waste treatment plants; and

c. Regulate lagoon community developments to control dredging activities and insure that proper treatment facilities are made available.

13. The Federal Water Pollution Control Administration should assist current state programs by undertaking cooperative studies, surveys and research in the following areas:

a. Accurate and current inventories of all sources of waste, to include waste volumes and characteristics;

b. Location of areas with high densities of individual septic tanks and cesspools, and the effects of such systems on surface and ground water quality;

c. Field sampling and laboratory analyses to determine present water quality in those areas where existing data are inadequate;

d. Effects of stormwater overflow and urban runoff on water quality, and methods to control such sources;

e. Types and amounts of agricultural chemicals used in the region, with a determination of the effects of runoff of such pollutants on the receiving waters;

f. Location of areas with obnoxious growths of aquatic weeds and algae, with control measures to reduce nuturient inflow to such waters as well as to eliminate present problems by physical removal or chemical control;

g. Magnitude of the problem of pollution by recreational and commercial boats, to include oil pollution, and needed control procedures to abate this source of pollution;

h. Location and extent of thermal pollution problems;

i. Physical conditions affecting ocean and estuarine outfalls in the Region;

j. Geologic and hydrologic properties of ground water aquifers to develop ground water potential and eliminate danger of salt intrusion;

k. Development of advanced waste treatment methods;

l. Implementation of a large integrated data storage and retrieval system; and

m. Training programs for waste treatment plant operators and State surveillance personnel is essential to assure maximum treatment plant efficiencies.

14. The State of New Jersey should undertake additional studies, surveys and programs to cover the following:

a. Projects designed to replace individual waste disposal systems by municipal collection and treatment facilities; and

b. Inventory boat marinas to determine the adequacy of present and on-shore treatment devices, and the need for such devices to handle waste from recreational boating.

15. An investigation of the existing legal and institutional arrangements which deal with water quality problems on a local, regional or statewide basis must be undertaken to determine their adequacy in effecting and implementing water pollution control programs.

16. Investigations must be carried out to determine the fiscal contribution of each basin entity (government and private) to meet expenditures required for immediate and long range pollution control and resource management programs. The role of Federal, State, local and private bodies must be evaluated in terms of costs and benefits. An indication of the

economic impact water pollution abatement may have on the region as a whole should be determined if programs aimed at achieving better water quality are to receive an appropriate share of public and private expenditures.

17. A need for close coordination of water quality problems indicates that a regional approach is best suited to promote inter-local cooperation between municipalities, to coordinate planning among townships and counties, and to administer State and Federal programs. Regional water management authorities must ensure that the needs of the minor or tributary river basins are reviewed, weighed and/or integrated into the major river drainage basin programs.

TABLE II-1

SUMMARY OF COST DATA FOR NON-INDUSTRIAL [a] WASTE SOURCE ABATEMENT THROUGH 1990 FOR INTERSTATE WATERS, NEW JERSEY COASTAL REGION

Priority [b]	Municipal, Institutional and Federal No. Plants	 Cost [c]
I	8	$46,300,000
II	18	35,700,000
III	32	49,900,000
IV	12	5,700,000
	70	$137,600,000

Construction Activity Code [d]	No. Plants	Cost
02	25	$88,600,000
04	25	35,500,000
05	18	11,000,000
06	2	2,500,000
	70	$137,600,000

---

[a] No industrial construction is required in this Region. See text and Table III-2 for abatement action required at Toms River Chemical Co.

[b] See Appendix A for priority criteria.

[c] See Appendix C for cost estimating procedures.

[d] See Appendix B for construction activity coding.

TABLE II-2

SUMMARY OF COST DATA FOR NON-INDUSTRIAL [a] WASTE SOURCE ABATEMENT THROUGH 1990 FOR INTRASTATE WATERS, NEW JERSEY COASTAL REGION

Priority [b]	Municipal, Institutional and Federal	
	No. Plants	Cost [c]
I	-	-
II	-	-
III	3	$768,000
IV	1	61,000
	4	$829,000

Construction Activity Code [d]		
05	4	$829,000

---

[a] No industrial construction is required in this region.

[b] See Appendix A for priority criteria.

[c] See Appendix C for cost estimating procedures.

[d] See Appendix E for construction activity coding.

III - IMMEDIATE CONTROL NEEDS

To determine the immediate corrective actions necessary to ensure the preservation, development and enhancement of natural waters within the Region, an evaluation was made of immediate construction needs for each known municipal and industrial waste source. Non-construction needs, including research and field studies, are discussed in Section IV of this Report. In developing the needed construction activity, it was recognized that secondary treatment was the minimum permissible to provide that the need for such water use as water supply, recreation and sport-fishing could be met. Using this criteria, as well as such additional factors as dilution water available, strength and volume of waste discharge, existing treatment, and use of the receiving water, a system of priorities was formulated to identify the most significant problem areas.

All waste sources requiring corrective action were classified into one of four priority groupings ranked in descending order of urgency. Further details on the criteria used to develop these priorities are provided in the Appendix, but in general, those sources with relatively high population equivalents in terms of BOD loading, those with little or no treatment and those which discharge into streams which have only small amounts of dilution water were assigned the highest priorities.

The following sections present these immediate construction needs, together with estimated costs and priority, for both the interstate and intrastate waters of the New Jersey Coastal Region.

INTERSTATE CONSTRUCTION NEEDS

The interstate waters of the New Jersey Coastal Region are affected by 67 known municipal and institutional waste discharges, and three Federal waste sources which require some form of immediate construction. These sources serve an estimated 1,260,000 persons during peak seasonal loads. On a BOD basis, the industrial waste loading has been computed to be equivalent to that from 19,000 persons.

Needs by Priority

Table III-1 summarizes the needed construction activity by priority of urgency. Table III-2 identifies the specific sources by priority. Priority I, those waste sources demanding the most urgent attention, includes seven municipal and institutional sources and one Federal waste source, serving 562,000 persons or 42 percent of the Region's sewered population of 1,344,000. The two largest plants in the Region (Atlantic City's City Island Plant and the Asbury Park facility) serve 425,000 persons or 76 percent of those in Priority I.

Priority II includes 18 municipal and institutional facilities serving 301,000 persons or 22 percent of the Region's sewered population. Ocean City's obsolescent 3rd Avenue plant, serving a population of 100,000, requires complete replacement.

Priority III includes 30 municipal and institutional and two Federal facilities serving a total of 353,000 persons or 26 percent of the Region's sewered population.

Priority IV includes 12 municipal and institutional facilities serving 43,000 persons or three percent of the Region's sewered population.

Needs by Type of Construction

Table III-3 summarizes immediate construction needs in the interstate waters by type of construction required. Table III-4 presents detailed needs for municipal, institutional, and Federal facilities.

Twenty-five primary plants, serving 721,000 persons, are not suitable for upgrading to secondary treatment. These units should be replaced by new secondary treatment facilities.

Twenty-five other plants, serving 429,000 persons, are suitable for upgrading to provide secondary treatment, and should be so upgraded.

Eighteen intermediate plants, serving 90,000 persons, should be upgraded to provide secondary treatment.

Two secondary plants, serving 19,000 persons, are presently overloaded. Additional secondary facilities should be built to handle the present overload.

Immediate Construction Costs, Interstate Waters

The estimated costs of the construction needs for interstate waters are summarized in Table III-5. To finance this program of immediate pollution abatement of the interstate waters in the New Jersey Coastal Region will require an estimated total expenditure of at least $137,600,000. The costs include plant capacity sufficient to serve the anticipated population projected to 1990. Details on the procedure used for cost estimation are in Appendix C.

Although Priority I plants account for approximately one-third of the total cost of upgrading, they encompass the needs of nearly 45 percent of the present sewered population in the Region.

Twenty-five obsolescent and overloaded primary facilities must be replaced with plants capable of providing treatment to the secondary level. Replacement and upgrading of these facilities is estimated to cost $88,600,000 or 64 percent of the total cost in the Coastal Region and will satisfy the waste needs of three-fifths of the Region's sewered population.

Immediate Needs by Subbasin

Construction activity has been grouped into five major subbasins for analytical convenience. Subbasin boundaries were chosen on the basis of stream drainage, resort area concentration, or the confluence of waste sources. (See Table III-5 and the Regional map).

Two subbasins in the New Jersey Coastal Region are of special importance. Subbasin #4 includes the area in and around Atlantic and Ocean Cities. Four of the 14 plants in this subbasin are Priority I and require urgent action. These outmoded facilities attempt to handle two-thirds of the subbasin population. Subbasin #4 requires the greatest expenditure because of plant condition and population.

Twenty of the 27 facilities in subbasin #1 are in Priority III. This basin accounts for more than a third of the plants and approximately the same proportion of the total cost to upgrade. Almost 400,000 people are served by the facilities in subbasin #1.

The remaining three subbasins account for about half the number of facilities, although their plants handle only a third of the population load. Plants in the Wildwood Area of subbasin #5 require immediate attention because of their large size, their outmoded and substantially overloaded condition, and their poor maintenance and operation.

INTRASTATE CONSTRUCTION NEEDS

Four municipal and institutional waste sources serving 3,000 persons, discharge inadequately treated wastes to the intrastate waters of the New Jersey Coastal Region. No inadequately treated Federal or industrial wastes are discharged in intrastate waters.

Needs by Priority

Table III-6 summarizes the immediate construction needs for intrastate waters by priority of urgency, and Table III-7 presents the priorities by individual source. There are no Priority I or II waste sources. Three Priority III sources serve 2,700 persons and one Priority IV source serves 300 persons. All four sources are municipal or institutional.

Needs by Type of Construction

Table III-8 presents other detailed construction needs for the Region's intrastate waters. Four intermediate municipal and institutional plants serving 3,000 persons must be upgraded to provide secondary treatment. No Federal or industrial plants discharge inadequately treated wastes to the Region's intracoastal waters.

Immediate Construction Costs, Intrastate Waters

Table III-9 presents estimated costs required to construct the treatment facilities needed to abate wastes discharged to the New Jersey Coastal Region's intrastate waters. The total cost for both municipal and institutional pollution control needs on intrastate waters is estimated to be $829,000. The entire cost is for upgrading intermediate plants. No expenditures are presently required for Federal and industrial facilities discharging to the Region's intrastate waters.

TABLE III-1

IMMEDIATE CONSTRUCTION NEEDS BY PRIORITY INTERSTATE WATERS, NEW JERSEY COASTAL REGION SUMMARY [a]

Priority [b]	No.	Population Served [c]
		Municipal and Institutional
I	7	559,000
II	18	301,000
III	30	352,000
IV	12	43,000
	67	1,255,000
		Federal
I	1	3,000
III	2	1,200
	3	4,200
		Industrial
IV	1	20,000
		Totals
I	8	562,000
II	18	301,000
III	32	353,200
IV	13	63,000
	71	1,279,200 [d]

---

[a] See Table III-2 for listing of individual sources.

[b] See Appendix A for priority criteria.

[c] Population served for municipal sources under maximum seasonal loads. Population served for industrial source based upon number of persons employed plus population equivalent for industrial waste load. Population equivalents determined on a BOD basis using an estimated daily per capita loading of 0.167 pounds of BOD per day.

[d] Total of known population served.

TABLE III-2

IMMEDIATE CONSTRUCTION NEEDS BY PRIORITY INTERSTATE WATERS, NEW JERSEY COASTAL REGION

Source	Construction Activity Code [a]	Population Served [b]
Priority I [c]		
A. Municipal and Institutional		
Asbury Park	04	175,000
Atlantic City (City Island)	02	250,000
Atlantic City (Texas Avenue)	02	12,000
Ventnor - Margate	02	55,000
Wildwood City	02	50,000
Lakewood Boro	06	13,000
Weymouth Twp. (Belcoville) [d]	04	4,000
		559,000
B. Federal		
Lakehurst Naval A. S.	04	3,000
		3,000
Total of known population served		562,000
Priority II [c]		
A. Municipal and Institutional		
Jackson Twp. Mun. #1	05	2,000
Jackson Twp. Mun. #3	05	1,000
Ocean Grove	04	25,000
Neptune Twp. #1	02	20,000
Seaside Park	02	35,000
Beach Haven	04	15,000
Brigantine	05	25,000
Longport (35th Ave.)	02	7,000
Ocean City (3rd Ave.)	02	100,000
Sea Isle City	02	4,000
N. Wildwood City	04	30,000
Wildwood Crest	04	17,000
Dover Twp. (Toms River)	02	4,000
Berlin Boro	05	3,000
Middle Twp. (Cape May Court House)	04	5,000
Hamilton Twp. (Atlantic City Race)	04	1,000
Galloway Twp. N. J. Hwy. Auth	06	6,000
Weymouth Twp. (Belcoville) [d]	04	1,000
Total of known population served		301,000

TABLE III-2

IMMEDIATE CONSTRUCTION NEEDS BY PRIORITY
INTERSTATE WATERS, NEW JERSEY COASTAL REGION (Cont'd)

Source	Construction Activity Code [a]	Population Served [b]
A. Municipal and Institutional (Cont'd)	Priority III [c]	
Howell Twp. - Maxim Sewer Co.	05	4,000
Highlands	02	3,000
Deal	02	6,000
Allenhurst	02	2,000
Ocean - Interlaken	02	10,000
Bradley Beach #1	02	20,000
Bradley Beach #2	02	10,000
Neptune City	02	3,000
Avon-By-The-Sea	04	12,000
Belmar	02	30,000
Spring Lake Heights	04	8,000
Spring Lake Boro #1	02	12,000
Sea Girt	02	3,000
Manasquan	02	18,000
Point Pleasant Beach	04	15,000
Bay Head	04	6,000
Lavallette	02	5,000
Dover Twp. Ortley Beach	04	7,000
Seaside Heights	04	50,000
Surf City	04	15,000
Ship Bottom	04	20,000
Long Beach Twp.	02	50,000
Avalon	05	10,000
Stone Harbor	02	10,000
Brisbane Child Center	05	1,000
Lakewood Twp. (Leisure Village)	05	1,000
Berkeley Twp. (Clamming Cr.)	05	1,000
Mays Landing (Oakcrest School)	05	2,000
Long Branch #1	04	5,000
Long Branch #2	04	13,000
		352,000
B. Federal		
Ft. Hancock	04	1,000
Camp Evans	04	200
		1,200
Total of known population served		353,200

TABLE III-2

IMMEDIATE CONSTRUCTION NEEDS BY PRIORITY INTERSTATE WATERS, NEW JERSEY COASTAL REGION (Cont'd)

Source	Construction Activity Code [a]	Population Served [b]
	Priority IV [c]	
A. Municipal and Institutional		
Sea Bright	02	2,000
Spring Lake Boro #2	04	1,000
Berkeley Twp. S. Seaside Park	05	1,000
Ocean City (46th Ave.)	05	25,000
Tuckerton Mun. Utilities	05	7,000
Mystic Isles Sewer Co.	05	7,000
Lacey Twp. Forked Riv. Marina	04	7,000
Dover Twp. Bd. of Ed.	05	na
Middle Twp. (Garden Lake)	05	na
Hamilton Twp. (Bd. Ch. Freehold)	05	na
Longport (14th St.)	04	na
Ocean Twp. (Middlebrook)	05	na
		43,000
B. Federal		
None		
C. Industrial		
Toms River Chemical Corp.	C [e]	20,000
		20,000
	Total of known population served	63,000
	Grand total of known population served	1,279,200

[a] See Table III-4 for definitions of construction activity codes.

[b] Population served by municipal sources under maximum seasonal loads. Population served for industrial sources is the sum of plant population plus the plant's population equivalent on a BOD basis.

[c] See Appendix A for priority criteria.

[d] Weymouth Twp. (Belcoville Section) plant is included in both Priority I and II because of sludge discharges. It is recommended that the sludge discharged be removed as a Priority I action and the remainder of the improvements to this facility be considered in Priority II.

(Cont'd. of Table III-2)

e/ Domestic waste treatment consists of separate primary treatment, mixing with industrial wastewater in equalization chambers (pH 1-2) and final discharge into the ocean via an ocean outfall line. Provisions are available to store effluents during periods of neutral stratification when effluents might reach the water surface and be carried on to the beaches. These provisions can handle wastewater for about a 12-15 day plant operation period. Provisions for monitoring the waters in and around the ocean outfall should be provided.

na = Data not available.

TABLE III-3

IMMEDIATE CONSTRUCTION NEEDS BY TYPE, INTERSTATE WATERS, NEW JERSEY COASTAL REGION SUMMARY [a]

Construction Activity Code [b]	No.	Population [c]
Municipal and Institutional		
02	25	721,000
04	22	425,000
05	18	90,000
06	2	19,000
	67	1,255,000
Federal		
04	3	4,200
Total		
02	25	721,000
04	25	429,000
05	18	90,000
06	2	19,000
	70	1,259,200 [d]

[a] See Table III-4 for listing of individual sources.

[b] See Table III-4 for identification of construction activity code.

[c] Maximum seasonal population served.

[d] Total of known population served.

TABLE III-4

IMMEDIATE CONSTRUCTION NEEDS BY TYPE, INTERSTATE WATERS, NEW JERSEY COASTAL REGION MUNICIPAL, INSTITUTIONAL AND FEDERAL NEEDS

Code 02: Not suitable for upgrading to secondary. Build new primary and upgrade to secondary.

Waste Source	Population Served
A. Municipal & Institutional	
Atlantic City (City Island)	250,000
Atlantic City (Texas Ave.)	12,000
Ventnor - Margate	55,000
Wildwood City	50,000
Neptune Twp. #1	20,000
Seaside Park	35,000
Longport (35th Ave.)	7,000
Ocean City (3rd Ave.)	100,000
Sea Isle City	4,000
Dover Twp. (Toms River)	4,000
Highlands	3,000
Deal	6,000
Allenhurst	2,000
Ocean-Interlaken	10,000
Bradley Beach #1	20,000
Bradley Beach #2	10,000
Neptune City	3,000
Belmar	30,000
Spring Lake Boro #1	12,000
Sea Girt	3,000
Manasquan	18,000
Lavallette	5,000
Long Beach Twp.	50,000
Stone Harbor	10,000
Sea Bright	2,000
Total of known population served	721,000

Code 04: Suitable for upgrade to secondary. Build new secondary facilities.

Waste Source	Population Served
A. Municipal & Institutional	
Asbury Park	175,000
Weymouth Twp. (Belcoville) [a]	4,000
Ocean Grove	25,000
Beach Haven	15,000

TABLE III-4

IMMEDIATE CONSTRUCTION NEEDS BY TYPE, INTERSTATE WATERS, NEW JERSEY COASTAL REGION MUNICIPAL, INSTITUTIONAL AND FEDERAL NEEDS (Cont'd)

Code 04: Suitable for upgrade to secondary. Build new secondary facilities. (Cont'd)

Waste Source	Population Served
A. Municipal & Institutional (Cont'd)	
N. Wildwood City	30,000
Wildwood Crest	17,000
Middle Twp. (Cape May Court House)	5,000
Hamilton Twp. (Atlantic City Race Track)	1,000
Weymouth Twp. (Belcoville) [a]	1,000
Avon-By-The-Sea	12,000
Spring Lake Hgts.	8,000
Point Pleasant Beach	15,000
Bay Head	6,000
Dover Twp. - Ortley Beach	7,000
Seaside Hgts.	50,000
Surf City	15,000
Ship Bottom	20,000
Long Branch #1	5,000
Long Branch #2	13,000
Spring Lake Boro #2	1,000
Lacy Twp. Forked River Marina	Na
Long Port (14th St.)	Na
	425,000
B. Federal	
Lakehurst Naval Air Station	3,000
Fort Hancock	1,000
Camp Evans	200
	4,200
Total of known population served	429,200

Code 05: Intermediate Plant suitable for upgrading. Build new secondary facilities.

Waste Source	Population Served
A. Municipal & Institutional	
Howell Twp. Maxim Sewer Co.	4,000
Brigantine	25,000
Berlin Boro	3,000

TABLE III-4

IMMEDIATE CONSTRUCTION NEEDS BY TYPE
INTERSTATE WATERS, NEW JERSEY COASTAL REGION
MUNICIPAL, INSTITUTIONAL AND FEDERAL NEEDS (Cont'd)

Code 05: Intermediate Plant suitable for upgrading. Build new secondary facilities. (Cont'd)

Waste Source	Population Served
A. Municipal & Institutional (Cont'd)	
Avalon	10,000
Brisbane Child Center	1,000
Lakewood Twp. (Leisure Village)	1,000
Berkeley Twp. (Clamming Cr.)	1,000
Mays Landing (Oakrest School)	2,000
Berkeley Twp. S. Seaside Park	1,000
Ocean City (46th Ave.)	25,000
Tuckerton Mun. Utilities	7,000
Mystic Isles Sewer Co.	7,000
Dover Twp. Board of Education	Na
Middle Twp. (Garden Lake)	Na
Hamilton Twp. (Bd. Ch. Freehold)	Na
Ocean Twp. (Middlebrook)	Na
Jackson Twp. #1	2,000
Jackson Twp. #3	1,000
Total of known population served	90,000

Code 06: Secondary plant presently overloaded but in good condition. Build new facilities to handle overload.

Waste Source	Population Served
A. Municipal & Institutional	
Lakewood Boro	13,000
Galloway Twp. (N. J. Hwy. Auth.)	6,000
Total of known population served	19,000
Grand total of known population served	1,259,200

a/ Weymouth Twp. (Belcoville section) plant is listed under two codes, since the removal of sludge discharge is Priority I and the remainder of improvements are Priority II.

Na = Data not available.

TABLE III-5

IMMEDIATE CONSTRUCTION COSTS
INTERSTATE WATERS, NEW JERSEY COASTAL REGION, MUNICIPAL, INSTITUTIONAL, FEDERAL AND INDUSTRIAL NEEDS THROUGH 1990

Priority[a]	No. Plants[b]	Estimated Plant Cost[c]	Estimated Cost Ancillary Works[d]	Total Cost
I	8	$25,300,000	$21,000,000	$46,300,000
II	18	19,500,000	16,200,000	35,700,000
III	32	27,300,000	22,600,000	49,900,000
IV	13	3,100,000	2,600,000	5,700,000
	71	$75,200,000	$62,400,000	$137,600,000
Construction Activity Code[a]				
02	25	$48,400,000	$40,200,000	$88,600,000
04	25	19,400,000	16,100,000	35,500,000
05	18	6,000,000	5,000,000	11,000,000
06	2	1,400,000	1,100,000	2,500,000
	70[e]	$75,200,000	$62,400,000	$137,600,000
Sub-basin[f]				
#1	25	$23,900,000	$19,800,000	$43,700,000
#2	17	9,400,000	7,800,000	17,200,000
#3	7	7,700,000	6,400,000	14,100,000
#4	14	24,700,000	20,500,000	45,200,000
#5	7	9,500,000	7,900,000	17,400,000
	71	$75,200,000	$62,400,000	$137,600,000

[a] See Table III-4 for construction activity code, and Appendix A for priority criteria.

[b] Weymouth Twp. (Belcoville) is included in two priority categories and twice in Construction Code total.

[c] Estimated plant cost = (1966 population served x factor projecting to year 1990) x (unit cost per capita) x (projected 1970 FWPCA construction cost index) x (factor for engineering, legal and other fees).

[d] Estimated cost for ancillary work = (Estimated cost of plant) x (.83).

[e] Construction Activity not required for the single industrial (chemical) plant.

[f] See map "Waste Sources and Discharge Waters in the New Jersey Coastal Area."

TABLE III-6

IMMEDIATE CONSTRUCTION NEEDS BY PRIORITY, INTRASTATE WATERS, NEW JERSEY COASTAL REGION, SUMMARY [a]

Priority [b]	No.	Population [c]
	Municipal and Institutional	
I	-	-
II	-	-
III	3	2,700
IV	1	300
	4	3,000 [d]

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[a] See Table III-7 for listing of individual sources.

[b] See Appendix A for priority criteria.

[c] Maximum seasonal population served.

[d] Total of known population served.

TABLE III-7

IMMEDIATE CONSTRUCTION NEEDS BY PRIORITY, INTRASTATE WATERS, NEW JERSEY COASTAL REGION

Source	Construction Activity Code [a]	Population Served [b]
	Priority I [c]	
None		
	Priority II [c]	
None		
	Priority III [c]	
A. Municipal and Institutional		
Jackson Twp. Mun. #2	05	1,000
Jackson Twp. - Harmony Sewer Co.	05	700
Wynnewood Sewer Co.	05	1,000
		2,700
	Priority IV [c]	
A. Municipal		
Southern Freehold Regional High School	05	300
		300
	GRAND TOTAL	3,000 [d]

[a] Code 05: Intermediate Plant suitable for upgrading. Build new secondary facilities.

[b] Maximum seasonal population served.

[c] See Appendix A for priority criteria.

[d] Total of known population served.

TABLE III-8

IMMEDIATE CONSTRUCTION NEEDS BY TYPE, INTRASTATE WATERS, NEW JERSEY COASTAL REGION, MUNICIPAL AND INSTITUTIONAL NEEDS

Code 05: Intermediate Plant suitable for upgrading. Build new secondary facilities

Waste Source		Population Served
Jackson Twp. Mun. #2		1,000
Jackson Twp. - Harmony Sewer Co.		700
Southern Freehold Regional H.S.		300
Wynnewood Sewer Co.		1,000
	Total	3,000 a/

a/ Total of known population served.

TABLE III-9

IMMEDIATE CONSTRUCTION COST, INTRASTATE WATERS, NEW JERSEY COASTAL REGION, MUNICIPAL AND INSTITUTIONAL NEEDS THROUGH 1990

Priority [a]	No. Plants	Estimated Plant Cost [b]	Estimated Cost Ancillary Work [c]	Total Cost
I	-	-	-	-
II	-	-	-	-
III	3	$420,000	$348,000	$768,000
IV	1	61,000	-	61,000
	4	$481,000	$348,000	$829,000
Construction Activity Code [a]				
05	4	$481,000	$348,000	$829,000
Sub-basin [d]				
#1	2	$201,000	$116,000	$317,000
#2	2	280,000	232,000	512,000
	4	$481,000	$348,000	$829,000

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[a] See Table III-7 for construction activity code, and Appendix A for priority criteria.

[b] Estimated plant cost = (1966 population served x factor projecting to year 1990) x (unit cost per capita) x (projected 1970 FWPCA construction cost index) x (factor for engineering, legal and other fees).

[c] Estimated cost for ancillary work (interceptors, outfalls, pumping stations, etc.) = (Estimated cost of plant) x (.83).

[d] See map "Waste Source and Discharge Waters in the New Jersey Coastal Area".

IV - OTHER MANAGEMENT AND RESEARCH NEEDS

STREAM SURVEILLANCE PROGRAMS

To effectively accomplish the objectives of a water quality management program designed to protect and ennance prime water usages as established by State authorities, it is necessary that adequate stream surveillance programs be established. Such programs should include a network of manual and automated sampling stations which permit the collection, evaluation and dissemination of water quality data, so as to present a clear picture of conditions in any section of the New Jersey Coastal Region. These monitoring stations should be strategically situated near major wastewater sources so as to alert pollution control authorities to irresponsible or accidental discharge of harmful material. Hence, appropriate corrective actions can be taken immediately. New Jersey has established a network of 200 stream quality stations, most of which are located on fresh water streams. These stations are sampled regularly four times a year. An expansion of the network, particularly in tidal waters and the installation of automated monitoring equipment, would greatly enhance the States' stream surveillance program.

OPERATION AND MAINTENANCE

An adequate program of operation and maintenance at waste treatment plants is necessary to ensure that the existing and recommended new treatment facilities will be effective in maintaining adequate water quality.

Adequate operation of a waste treatment plant requires qualified resident personnel, proper laboratory control, and accurate record keeping. State, interstate and federal agencies must provide programs aimed at ensuring these three factors are included at each plant.

State regulations require that licensed personnel operate and maintain all sewage treatment facilities in the State. Because of the limited number of qualified personnel in the field, these requirements are difficult to meet. In many cases, licensed operators are responsible for more than one treatment facility. Their surveillance at each facility is limited and effective operational control is often minimized. There is an urgent need for both advanced and elementary training programs in treatment plant operation. Such training should be continuous and should lead to State licensing of operators.

The State has launched new training programs to be offered at various state and county colleges. These programs are aimed at making available to those interested in water pollution control and who wish to enter the field as licensed operators, a basic course in wastewater treatment. Other advanced courses designed to broaden the knowledge of experienced operators and provide background and understanding of the new technological advances in the field will also be presented.

Federal grants to aid the states in meeting their responsibility for the training of qualified personnel should be made available. Federally sponsored and conducted training programs should also be established to assist in the training of personnel.

In order to ensure the successful implementation of any operation and maintenance program, the State must have a sufficient number of trained inspectors to periodically visit plants to review operation and laboratory control methods, and to provide technical assistance to plant personnel.

SPECIAL STUDIES AND SURVEYS

Municipal and Industrial Waste Inventory

A review of the available data on location, volumes and characteristics of existing municipal and industrial waste discharges within the Region indicates the need for more adequate information. The information contained in this report should be validated, in many cases requiring field surveys. In addition, once an adequate base inventory has been established, there is a need to maintain the data current. The state should develop adequate records providing the latest information on all waste loads for use in planning, and in the determination of further pollution abatement needs.

Package Plants

A number of small package treatment plants serve various housing developments, restaurants and other businesses located throughout the Region. These plants provide some treatment but reportedly have a number of operational and maintenance problems. Staffing requirements for these many small and scattered facilities complicate further the already serious shortage of qualified plant operators discussed earlier. No data regarding package treatment plants and the problems they are creating are available. Studies should be conducted to determine the number and location of plants operating in the Region and the effect of these treatment facilities on the receiving waters. The State of New Jersey generally considers package treatment plants as temporary installations to be abandoned when permanent facilities are constructed. The State should hasten the elimination of these plants by the timely construction of regional, intermunicipal and intercounty sanitary sewage systems. The issuance of permits for the installation of new package treatment plants should be more closely scrutinized in view of existing or proposed county and local sewage masterplans.

Septic Tank Survey

Within the New Jersey Coastal Region there are an estimated 300,000 persons who dispose of domestic wastes by individual septic tanks or cesspools. There are no adequate data indicating the pollutional effects of such systems. Studies should be conducted to determine the following:

1. Location of those areas with large numbers of septic tank systems.

2. Determination of the effects such systems have on surface and groundwater.

3. The implementation plan for eliminating individual disposal systems by connection to existing or new municipal collection systems. Planning of such systems should be based on regional, inter-county and inter-municipal areas.

While the first two items could be accomplished by the Federal Water Pollution Control Administration in cooperation with State and Federal agencies, the third item is the responsibility of State and local government. Existing Federal grant programs could be used to accelerate the planning, design, and construction of such regional collection systems.

Thermal Pollution

With the growth in thermonuclear power plants and continuing increase in industrial cooling water usage, pollution of these waters by heat may become a critical problem. All existing sources of thermal pollution should be identified and determinations made of their effects on the aquatic environment. Plans for new facilities should include provision for cooling towers or other means to prevent discharge of heated wastes.

Stormwater Overflow and Urban Runoff

Within the New Jersey Coastal Region there are three municipal sewerage systems serving 61,000 persons that have, at least in part, combined storm and sanitary sewage collection. There is a need to determine the extent to which such overflows degrade water quality, and similarly, the magnitude and effects of urban runoff directly to the receiving waters.

Boat Pollution

There is a need to determine the magnitude of the problem associated with the discharge of litter, sewage, and oil from the large numbers of watercraft in the Region. Investigations should include research to develop practical means of controlling this source, surveys to determine the need for adequate disposal facilities at marinas, and a determination of adequate legislation to control such pollution. The State of New Jersey does not, at present, have any regulations governing the discharge of wastes from boats in tidal waters. Assuming the development of adequate legislation and satisfactory control devices, there will be a need for extensive enforcement activity to ensure control of this source.

Agricultural Runoff

There are no data available to indicate the extent of water pollution attributable to agricultural runoff. Since runoff from cultivated fields may convey fertilizers, herbicides and pesticides to the receiving waters, the potential dangers of such pollution to human and fish and wildlife require a thorough investigation. Such a study should include a determination of the types and amounts of agricultural chemicals being used, analytical data to measure the concentration of these chemicals in the receiving streams, and research into allowable concentrations and adequate control measures. The study should also include estimates of the amounts of water used for irrigation.

Water Quality Studies

The data included in Section VI indicate the extent to which existing water quality data are inadequate. Necessary field and laboratory sampling and analyses must be conducted to provide adequate data on existing water quality. Such information will not only confirm suspected problem areas and locate those areas with problems as yet unknown, but will establish a base against which future changes in water quality can be measured.

Aquatic Plants and Nutrients

Some areas within the New Jersey Coastal Region are plagued by dense growths of aquatic weeds and algae to the extent that interference with beneficial water use results. There is a need for a survey to determine the extent and location of such plant growths, the determination of contributing causes and the development of programs to control the problem. Such control programs should include reduction in the quantities of nutrient materials discharged to the waters as well as means of physical removal of dense plant growths.

Advanced Waste Treatment

Greater emphasis should be placed on the application of advanced waste treatment techniques, particularly in those areas where the discharge of secondary waste treatment effluent into small receiving waters results in degradation of water quality. The application of such advanced treatment techniques should be considered for both municipal and industrial wastes.

Hydrodynamic Studies

Knowledge of such factors as water currents, stratification, and dispersion of pollutants is lacking for many of the waters in the Region. Although some studies have been made by various Federal, State, and Academic groups, there is a need for better coordination of existing studies and a more comprehensive approach to obtain an adequate understanding. This need is particularly great where ocean outfalls are concerned, as 34 waste treatment facilities presently discharge into the Atlantic and others as yet unbuilt with certainly do so. The effects of the numerous canals and lagoons dredged into the perimeter of various bays and sounds to provide shore frontage for high density summer communities should also be scrutinized. After the facts are ascertained, legislation regulating the building of ocean outfalls and lagoon communities may be desirable.

Salt Water Intrusion

Detailed studies of the geologic and hydrologic properties of ground water aquifers will be needed to develop fully the Region's water supply potential and to eliminate the danger of salt water intrusion along the highly populated sea coast. These studies should be conducted so that the related problems of advanced waste treatment and groundwater recharge can also be considered.

Data Systems

With the increasing tempo of data collection by a number of agencies at all levels of government, there is a need for an integrated system of handling water quality and water use data within the Region. Such a system which might be based on the existing Federal Water Pollution Control Administration STORET program will make possible better interchange of knowledge and eliminate duplication of studies. Such an integrated system would further be of great value in permitting the application of such techniques as mathematical modelling and systems analysis in the development of overall water quality management programs.

Regional Cooperation

A review of water quality problems and water needs within the New Jersey Coastal Region points out the interrelationship throughout the entire Region. There is a need for close coordination if water quality management is to ensure that on-going and future programs look beyond immediate interests and effect a comprehensive plan for the Region as a whole. Studies recommending the creation of regional authorities must ensure that the needs of the smaller river basins are represented, weighed and/or integrated into the regional water management programs. Regional authorities may well be the operating mechanism best composed to promote inter-local cooperation between municipalities to coordinate planning among townships and counties, and to administer State and Federal programs.

Legal Framework

To ensure that adequate water pollution control programs can be formulated and implemented, there is a need to evaluate existing legal mechanisms and institutional arrangements to determine their adequacy to deal with water quality problems on both local and a regional basis. At the present time there is a lack of data on the adequacy of existing framework, as well as a lack of information on the interrelationships between various authorities and governmental agencies in dealing with the problem of resource management. In a number of localities there is a requirement for additional legislation to zone present and future shoreline developments, as well as to control the use of the ocean and offshore waters as a receiving body for wastes.

Financial Arrangements

Investigations must be carried out to determine the amount of financial participation each basin entity (government and private) should produce to meet expenditures required for immediate and long range pollution control programs. The role of Federal, State, local and private bodies must be evaluated in terms of cost and benefits to give an indication of the economic impact of water pollution control programs and their effects upon the Region as a whole. Such problems as competition between various public works programs such as highways, education, and water pollution control must be evaluated to ensure that programs aimed at achieving water quality management receive a proportionate share of total public and private expenditures.

Miscellaneous Studies

In addition to the outline of studies listed above there is a need to survey a variety of other existing pollutional sources and potential problem areas.

V - RECENT PROGRESS IN POLLUTION CONTROL

STATE OF NEW JERSEY

In 1964, the New Jersey State Department of Health established a program of stream classification. The Department adopted water quality criteria for various uses of water and after public hearings issues formal rules and regulations classifying the waters and establishing minimum waste treatment requirements. Following a series of public hearings the State adopted in May 1967 standards for the waters of the Atlantic Coastal Basin and subsequently submitted these standards to the Secretary of the Interior under the Water Quality Act of 1965. Appendix D presents the classifications for these waters as submitted to the Secretary, rules and regulations for treatment requirements for all wastes discharged to these waters, and a copy of a typical pollution abatement order issued by the Department to achieve compliance with these standards. Similar orders were issued to a number of municipalities and institutions, as shown in Table D-1.

The State Public Sanitary Sewerage Facilities Act of 1965 authorizes the Commissioner of Health to make grants and loans to local governmental units for the preparation of feasibility studies on the engineering design of public sanitary sewerage facilities. The law declares that it is the Public policy of the State, "to encourage and support, as hereinafter provided, the promotion, planning, development and construction of public sanitary sewerage facilities, including collection, transmission, treatment and disposal works on a regional or multi-unit basis."

Grants are authorized for the purpose of preparing feasibility studies and reports on projects for the collection, treatment and disposal of sewage involving two or more local governmental units, acting together on a joint basis. Loans are authorized for the preparation of preliminary engineering plans, detail design, engineering drawings and specifications, and contract documents for the construction of a new, or expansion of an existing, sewerage facility provided a feasibility study or a report upon the facility has been filed with and approved by the Commissioner. This Act became effective July 1, 1965 with $1,000,000 appropriated for carrying out the grant and loan provisions. Additional funds have been appropriated for subsequent years.

During 1966, the Governor's office undertook a comprehensive review and evaluation of the State's administration of water pollution control programs. In a recent message to the legislature, the Governor proposed a greatly expanded management program that calls for a marked increase in personnel and requests higher compensation, in order that competent people will be attracted to State service.

There has been increasing emphasis on water pollution control by the State of New Jersey, and a number of new programs initiated. To carry out the State's water quality management programs the Commissioner of the New Jersey State Department of Health in 1967 created the Division of Clean Air and Water.

In 1967, the State of New Jersey enacted additional pollution abatement legislation encouraging the broad and active participation of representative leaders of industry, labor, government and selected professional societies in the clean waters program of the State. It created a Clean Water Council, within the State Department of Health, to advise the Commissioner on matters relevant to the management of the State's water pollution control program, to conduct studies and hearings pertinent to the program, and to make enlightened recommendations to the Commissioner. It authorized the Commissioner of Health (subject to the availability of funds) to make grants to any county or municipality, or any combination or agency thereof or any State or interstate agency to assist such governmental units in the construction of those water pollution control projects as qualify for Federal Aid. The State's contribution toward the construction of such projects shall not exceed 30 percent of the cost of that portion of said projects that shall qualify for Federal Assistance. Under the provision of the Federal Water Pollution Control Act, as amended, this grant program makes possible increased Federal construction grants participation. In addition, the legislature broadened the program of loans and grants for feasibility studies and engineering reports and established educational scholarship programs at the graduate and undergraduate level to help further the purposes of administering the State's clean waters program by attracting qualified students to those fields of engineering essential to the progress of pollution abatement and water resource development.

FEDERAL

Federal Water Pollution Control Administration personnel and resources have been employed in a number of instances to investigate and abate pollution in the New Jersey Coastal Region. In addition to the activity of the construction grants program a number of laboratory and field studies have been carried out.

Investigations of Barnegat Bay in and around the Oyster Creek area were conducted. Data assembled from this inquiry will be used to contribute toward an evaluation of the effects the new nuclear power plant at Oyster Creek may have on bay waters.

Some analytical data were collected during a special survey of the industrial waste problems of the Toms River Chemical Corporation. This survey included interviews with plant personnel, and inspection and analysis of samples of river waters in the vicinity of the plant and at the terminus of the ocean outfall.

Technical assistance was extended parties interested in correcting aquatic growth along beaches and at the mouth of the Metedeconk River.

An inventory of major waste sources in the New Jersey Coastal Region was completed by the Project. Field personnel contacted most of the municipal plant officials and inspected a majority of the facilities. Contact and interview was also made with those industries felt to be a pollution problem. Much of the analysis determining immediate needs action was based on data collected during this waste source inventory.

Project personnel have prepared a preliminary enforcement conference report (unpublished) on the economic effects of pollution on the shellfish industry of the New Jersey Coastal Region.

In the New Jersey Coastal Region, to date, the Federal Water Pollution Control Administration's Construction Grants Program has spent or allocated $4.8 million of the Area's total waste facilities construction cost of $13.8 million. This amounts to a Federal participation ratio of one Federal dollar to every three State-and-local dollars.

On-going studies by the Corps of Engineers including the North Atlantic Regional Framework Study and the Northeast Water Supply Study are aimed at providing broad based survey data on both present and future water resource problems within the New Jersey Coastal Region. Both of these studies involve a number of Federal agencies, as well as the water pollution control and water resource agencies of New Jersey.

INDUSTRIAL

Only one large industry, the Toms River Chemical Corporation, in the Coastal Region could be considered a significant pollutional source. This firm, however, has acted to minimize the effects of its industrial waste load by discharging into the ocean through a submerged outfall. For much of the year the receiving waters have a density stratification sufficient to trap the effluent at mid-depth. There are, however, a few weeks of the year when a color problem exists because stratification breaks down and the wastes reach the ocean surface. During these periods, which do not usually occur during the bathing season, wastes may be washed on to the beach. Presently, this chemical firm has facilities to store 12 to 15 days' waste load.

If effective surveillance instrumentation is installed in the outfall area, then the storage capacity may be more effectively employed to prevent occurrence of the problem.

VI - BACKGROUND FOR RECOMMENDATIONS

KNOWN WATER QUALITY PROBLEMS

To determine the extent that municipal, industrial and other waste discharges have affected the quality and use of the New Jersey Coastal Region waters, an evaluation was made, based on existing data from limited Project field surveys, and State reports and records. Analytical data were compared with parameter values regarded as acceptable for such water uses as water supply, recreational bathing and boating, and sport fishing. The following streams and water bodies were found to have water quality below that required for the expected water uses. Specific problems and those areas requiring further study are also indicated.

Shark River

The Shark River is characterized by depressed dissolved oxygen and high BOD levels which indicate poor water quality. Bacteriological data show that high coliform density counts have also occurred throughout the river area. These conditions may be caused by the waste-water discharges of the New Jersey State Highway's secondary treatment plant at Wall Township and the Camp Evans installation presently served by primary treatment. Several recreational marinas located near the Atlantic Ocean outlet may also be contributing to the degradation of these waters. Additional investigation should be performed to determine to what extent these marinas are affecting water quality in the area.

Manasquan River

Low pH and high BOD levels suggest that the Manasquan River is in a state of deterioration near the Atlantic Ocean and the juncture with the Bay Head Canal. Agricultural drainage, recreational boating (25 marinas located in the area) and septic tank seepage are suspected causes. High bacterial coliform counts have also been recorded downstream from the discharges of the two secondary and three intermediate municipal treatment facilities discharging into the river. Since the Manasquan River is considered as a potential surface water supply source, additional investigation and subsequent corrective action must be accomplished.

Metedeconk River

The North and South Branches of the Metedeconk River receive the waste discharges of one secondary and six intermediate municipal plants. Both the Jackson Municipal Plant #1 and the Lakewood Boro Plant which are presently operating under overloaded conditions are suspected as being significant contributors to the poor water quality in the area. In the North Branch there is evidence of oil and toxicity problems. In the South Branch municipal waste discharges have created serious problems. High BOD values were recorded at Laurelton near the confluence of both branches. This area was also void of biological species. Additional survey work should be conducted in the vicinity of Laurelton to determine more accurately the causes of these high BOD levels and lack of biological growth.

Toms River

Low dissolved oxygen levels and the absence of pollution sensitive organisms indicate that the waters of the Toms River above the estuary are being adversely affected by the wastewater discharges of three municipal treatment plants and one federal sewage installation. The primary treatment facility at the Lakehurst Naval Air Station is the principal contributor to this water quality degradation. Data also indicate that a toxicity problem exists in these waters. Additional investigations should be made in this area to determine the source of toxicity.

In the estuary proper, high BOD values and high coliform and fecal coliform densities were recorded up to the confluence of Ridgeway Brook. No bottom organisms were found in the upper reaches of the estuary and extensive sludge deposits were also noted throughout. It is suspected that the Lakehurst Naval Station's primary plant and the overloaded Dover Township primary facility are affecting this area. Septic tank seepage and recreational boating (there is one small marina located in the Toms River Estuary) may also be contributing pollutional matter to these waters. These waste sources must be investigated further.

Barnegat Bay from Mantoloking Bridge to Manahawkin Bridge

The dredging of numerous canals and lagoons to provide shore frontage for summer cottages has created poor water circulation and contributed to water quality problems along the western shore of Barnegat Bay. The intracoastal waterway channel is of good quality.

Great Bay and its Tributaries

High total and fecal coliform densities have been recorded in the West Branch of the Wading River near Jenkins. Depressed dissolved oxygen content and low pH values have severely limited biological growth. The East Branch is also of poor water quality. There are no sewage treatment facilities located along the Wading River.

The water quality of the Mullica River is characterized by low dissolved oxygen contents and limited biological growth. Four municipal secondary treatment plants discharge effluents into tributaries to the Mullica River. Of these facilities, the overloaded New Jersey State Highway Authority Plant at Galloway Township is contributing the greatest amount of pollutional material.

Other factors which may also be affecting water quality in the Great Bay area are recreational boating, poor hydrographic conditions and septic tank seepage. Additional investigation to more accurately delineate the sources of pollution is required.

Intracoastal Waters From Absecon Inlet to Cape May

In general, the area from Absecon Inlet to Cape May can be categorically considered as being of poor water quality. This condition has been primarily caused by the discharges of the 23 municipal sewage treatment facilities located in the area. The outdated and/or overloaded facilities at Brigantine, Ocean City, Sea Isle City and Wildwood City are contributing most to the degradation of these waters. Existing hydrographic conditions, eutrophication, septic tank seepage and recreational boating activities are also suspected of contributing to poor water quality. These sources of pollution should be further investigated.

The small size and low summer flows of the streams tributary to the intracoastal waters contribute to their generally poor quality.

STREAM CATEGORIZATION

To highlight the extent of existing information on present water quality of the various streams, inlets and bays within the Region, a system of categorization was used to summarize existing data. This system assigns to each water body one or more of the following categories:

Category I - No water quality problems;
Category II - Water quality problems are known and solutions readily identified;
Category III - Water quality problems are indicated by available data, but causes and/or solutions are unknown;
Category IV - Insufficient data to indicate presence or absence of problems.

The categories assigned to the receiving waters, as shown in Table VI-1, point out that little or no information is available as to the extent of pollution other than that from certain municipal and industrial waste discharges. Where available data indicate a need for increased treatment at existing plants, or for construction of new facilities, a Category II was assigned. In many cases, however, lack of information on other sources of pollution, or the seriousness of the problem, resulted in the additional assignment of Category III and/or IV.

Table VI-1 also indicates suspected sources and problems for the various streams. These data, which are based on limited analytical work, combined with knowledge of the particular water body, indicate a need for further studies to determine the extent and control of such pollutional problems as:

1. Pollution from recreational and commercial boating;
2. Septic tanks and cesspools;
3. Natural and man-caused eutrophication;
4. Thermal pollution; and
5. Agricultural drainage.

Since the categories have been assigned on the basis of present knowledge and conditions, continued surveillance should be undertaken to permit identification of new problems as they arise.

MUNICIPAL & INSTITUTIONAL POLLUTION SOURCES

Information on known municipal and industrial waste discharges within the New Jersey Coastal Region is presented in Tables VI-2A, VI-2B and VI-3. These data were compiled from the FWPCA Municipal Waste Inventory of 1962, New Jersey State Health Department records and a 1966 survey conducted by project personnel. However, due to a lack of information from these sources, it was necessary to make assumptions for some of the municipal waste sources and for many of the industrial waste discharges. Based on these data, there are 88 municipal and institutional, four federal, and one industrial sources discharging wastes into the inter- and intrastate waters of the New Jersey Coastal Region. Of the 93 sources listed in these tables, 75 provide less than adequate secondary treatment.

Municipal and Institutional Waste Discharges

Table VI-2A lists 75 waste facilities which handle the waste load of approximately 97 percent of the total sewered population, and which either discharge directly into interstate waters or into such intrastate waters as to affect the quality of interstate waters. Thirty-two discharge into the Atlantic Ocean via submerged outfalls and the remaining 43 into the intracoastal waterway or its tributaries. Eleven plants, serving a maximum seasonal population of more than 90,000, provide secondary treatment; 17 plants, serving more than 63,000, provide intermediate treatment; and 47 plants, serving more than 1,149,000, provide screening or primary treatment. Two of the eleven secondary plants, which serve 18,000 people, are seasonally overloaded.

Table VI-3 indicates those municipal and institutional plants discharging into intrastate waters in the Region. Eight of the thirteen plants, serving 30,800 people, provide secondary treatment, and the remaining five, serving 3,200 people, intermediate treatment. None of these plants are reported to be seasonally overloaded.

Many treatment plants along the coastline are burdened with enormously large waste loads during the summer tourist season. At least a dozen resort communities undergo population increases of 1,000 percent or more. Plant inventory data illustrate the enormity of this seasonal situation. Although the resident (year round) population in the Coastal Region numbered 603,700 in 1965, the aggregate population handled by all municipal and institutional waste systems in the Region during peak summer periods reached 1,344,000. Moreover, statistics from the U. S. Census of Housing show that less than half of the New Jersey Coastal resident population is connected to public sewage systems--somewhat more than 300,000 persons in the Region use septic tanks or cesspools for waste disposal (see: Other Pollution Problems, Section VI, for additional information).

Federal Waste Discharges

Table VI-2 identifies the three Federal installations discharging primary wastes from 4,200 people into interstate waters. Table VI-3 identifies the single Federal installation discharging secondary wastes from 2,000 people into intrastate waters. All four Federal installations discharge their treated wastes to waters used for recreation.

Industrial Waste Discharges

Industrial waste discharges are not a major pollution problem in the New Jersey Coastal Region because it is primarily a recreational and resort Region with only small amounts of industry.

Twenty-six industrial plants could, by virtue of their location, contribute waste to the intracoastal waters. Of this total, 13 discharge all wastes into municipal sewage facilities. Wastes from three firms are discharged to surface waters and cause occasional local pollution problems. Ten other plants in the Region utilize either dry processes or provide subsurface waste disposal. Ocean disposal is utilized by Toms River Chemical Corp., Toms River. This plant, which employs about 1,000 persons, produces dyes, resins and plastics. Treatment is provided the combined industrial waste and sanitary sewage. The effluent is discharged through a 3,500 foot long outfall into the Atlantic Ocean.

OTHER POLLUTION PROBLEMS

Recreational and Commercial Navigation

The discharge of oil by commercial traffic may be the result of bilge pumping or physical damage to a tanker or barge, as well as spillages which can occur during ship to shore transfer. At the present time this problem is largely confined to the ocean shoreline.

Septic Tanks and Cesspools

Over 300,000 year round inhabitants occupying approximately 100,000 housing units, as well as hundreds of business establishments within the New Jersey Coastal Region discharge their domestic sanitary wastes into individual septic tanks and cesspools. This relatively large number of individual systems can result in significant pollutional problems. For instance, where overflow from these facilities is discharged directly into the ocean, the intracoastal waterway and/or its tributaries, significant bacterial pollution can occur, causing the closure of bathing beaches and shellfish harvest areas. Nutrients necessary to the growth of aquatic vegetation are also added by such overflow practices.

In non-porous soils, tile fields often fail to handle septic tank overflows in a satisfactory manner, resulting in the overflow of effluent in backyards, streets and finally as surface runoff. Percolation of septic tank effluent into shallow ground water aquifers, which eventually discharge into springs, streams or lakes, adds pollutional material to these surface waters. Under proper geological conditions, deep aquifers can also become polluted by wastes from inadequate domestic disposal systems. Such contamination can produce public health problems in those areas where the ground water is developed for individual and municipal water supplies.

In addition to bacteria there are other substances which are ineffectively treated by cesspools and septic tanks and which have been found entering sub-surface aquifers. Although specific information on ground water pollution by such material is not at present readily available for the New Jersey Coastal Region, experience in other areas such as Long Island, New York, indicate that this problem can be extremely serious. To prevent such problems will require detailed investigations of the extent and location of individual waste disposal systems as well as the geology of the underlying soil.

Eutrophication and Aquatic Vegetation

There are certain waters in the New Jersey Coastal Region that are sufficiently rich in both phosphorus and nitrogen to support prolific growths of aquatic weeds and algae. Such growths can interfere with pleasure boating, bathing and other recreational water use.

The major sources of nutrients are the discharges of raw and treated municipal wastes. Other sources, the significance of which are not known, include the overflow or percolation from individual septic tank systems, direct discharges from recreational boating, and runoff from agricultural areas. The problem is complicated by restricted water movement and shallow water depths in many of the coves, inlets and bays in the area. There are very limited data available on the extent of this problem, the causes and control methods to be used to prevent further interference with water use.

Salt Intrusion

The availability of both ground and surface water sources to meet the future needs of the Coastal Region was discussed earlier in this report. It is evident, however, that as many resort areas and year round communities grow, and the demand for ground water increases, the danger of salt intrusion becomes more and more serious. This threat of salt water contamination is particularly evident within the narrow strip of land along the coast, extending three to eight miles inland where extensive pumping of ground water has caused depressions in the water table. Continual withdrawal by overpumping can lower the fresh water level enough to permit the entrance of salt waters.

This condition, found generally in the shallow water strata, exists to some degree from Cape May Point to Sandy Hook and as far north as Newark. In the Atlantic City area, where more ground water is being withdrawn than in other localities along the Coastal Region, the problem of salt water contamination constitutes the most significant threat to water supply sources. Similar salt water contamination is probably occurring in the lower portions of the deep artesian water-bearing formations found all along the Coastal Region. Consequently, the amount of fresh water available for withdrawal may soon be limited because of salt water contamination. Additional study in the area of fresh water-salt water relationships must be made to assure maximum development and total protection of the ground water supplies found within the Region.

When stream flows are sufficiently low, the various surface streams entering the Atlantic Ocean are also subjected to contamination by salt water. Salt water encroachment by streams can progress farther inland causing serious problems to surface water sources available for potable water use.

Thermal Pollution

Heat can be a source of water pollution. Presently, no significant sources of thermal pollution are found in the New Jersey Coastal Region. A large source of future thermal pollution will be the nuclear power plant of the Central Jersey Power and Light Company at Oyster Creek. It is scheduled to become operative in late 1967. This installation will use a minimum of 1,000 cfs of water per reactor (four reactors are presently proposed) with a temperature rise of 17° to 21°F. The warm water, which will be discharged into Barnegat Bay, can alter existing marine life and contribute to the luxurious growth of aquatic plants. It may also form a barrier to some desirable marine life, such as finfish.

TABLE VI-1

STREAM CATEGORY DESIGNATION
INTER- AND INTRASTATE WATERS

Name of Receiving Waters	Number of Pollution Sources		Category	Problem
	Municipal	Industrial		
Atlantic Ocean	33	1	IV	Ocean outfalls and dispersion of discharged wastes.
Intracoastal waters from Absecon Inlet to Cape May and selected tributaries	26	0	II	Municipal waste discharges.
			IV	Hydrographic and eutrophication. Septic tanks and rec. boating.
Patcong Creek	1	0	III	Low dissolved Oxygen and poor chemical composition. Extremly limited biological growth.
Manasquan River	6	0	IV	Possible low pH agricultural drainage and rec. boating (25 marinas).
North Branch-Metedeconk River	3	0	III	Existing municipal plants overloaded. Oil and toxicity problems.
South Branch-Metedeconk River	4	0	III	Municipal waste discharges.
Barnegat Bay	3	0	III	Poor hydrographic conditions.
			IV	Potential thermal pollution problems. Septic tank seepage and rec. boating.

TABLE VI-1

STREAM CATEGORY DESIGNATION
INTER- AND INTRASTATE WATERS (Cont'd)

Name of Receiving Waters	Number of Pollution Sources Municipal	 Industrial	Category	Problem
Toms River	4	0	II	Municipal Waste Discharges.
			III	Problem of Toxicity.
Manahawken Bay	1	0	I	-
Little Egg Harbor Bay	1	0	III	-
Mullica River	4	0	III	Low dissolved oxygen and limited biological growth.
Great Bay	1	0	III	High coliform counts
			IV	Hydrographic and rec. boating.
Forked River and Oyster Creek	2	0	III	Rec. marinas.
			IV	Possible hydrographic and environmental changes due to new atomic power plant.
Shark River	2	0	III	High coliform counts.
			IV	Rec. marinas.
Harveys Brook	1	0	IV	Municipal waste discharges.

NOTE: All other streams not listed above were not investigated and are considered as Category IV.

TABLE VI-2A

INVENTORY OF WASTE SOURCES DISCHARGING INTO INTERSTATE WATERS OF NEW JERSEY COASTAL BASIN, 1966

Waste Sources (arrayed from North to South)	Map Ident. No.	Max. Pop. Served (000)	Collection System	Year Built	Degree Treatment	Flow MGD		Est. BOD Discharged (PE, 000)	Receiving Waters	
						Des.	Act.		Name	Use
MUNICIPAL AND INSTITUTIONAL										
Highlands	2	9.2	na	na	Primary	1.2	.35	6.6	Atlantic O.	Rec.
Sea Bright	3	1.5	C	1939	Primary	.250	.200	1.0	Atlantic O.	Rec.
Deal	4	6.0	S	1928	Primary	1.30	.35	3.9	Atlantic O.	Rec.
Allenhurst	5	2.0	S	1927	Primary	.35	.20	1.3	Atlantic O.	Rec.
Ocean-Interlaken*	6	10.0	C	1935	Primary	.724	1.0	7.0	Atlantic O.	Rec.
Asbury Park	7	175.0	S	1934/59	Primary	5.3	6.0	130.0	Atlantic O.	Rec.
Ocean Grove	8	25.0	S	1920/66	Primary	.85	1.5	20.0	Atlantic O.	Rec.
Neptune Twp. #1	9	20.0	S	1932	Primary	1.16	2.5	16.0	Atlantic O.	Rec.
Bradley Beach #1	10	20.0	S	1929	Primary	.65	.15	13.0	Atlantic O.	Rec.
Bradley Beach #2	11	10.0	S	1929	Primary	.50	.08	6.5	Atlantic O.	Rec.
Neptune City	12	3.0	S	1928	Primary	.31	.30	1.9	Atlantic O.	Rec.

TABLE VI-2A

INVENTORY OF WASTE SOURCES DISCHARGING INTO INTERSTATE WATERS OF NEW JERSEY COASTAL BASIN, 1966 (Cont'd)

Waste Sources (arrayed from North to South)	Map Ident. No.	Max. Pop. Served (000)	Collection System	Year Built	Degree Treatment	Flow MGD		Est. BOD Discharged (PE,000)	Receiving Waters	
						Des.	Act.		Name	Use
Neptune Twp. #2	13	2.0	S	1965	Secondary	2.5	.20	.4	Atlantic O.	Rec.
Avon-by-the-Sea	14	12.0	S	1955	Primary	1.0	.27	7.8	Atlantic O.	Rec.
Belmar & S. Belmar	15	30.0	S	1940	Primary	2.5	1.2	20.0	Atlantic O.	Rec.
Spring Lk. Hgts.	16	8.0	S	1960	Primary	3.5	0.22	5.2	Atlantic O.	Rec.
Spring Lk. Boro#1	17	12.0	S	1930	Primary	1.5	.65	7.8	Atlantic O.	Rec.
Spring Lk. Boro#2	18	.7	na	na	Primary	.14	-	.5	Atlantic O.	Rec.
Sea Girt	19	3.0	S	1938	Primary	.50	.23	2.0	Atlantic O.	Rec.
Manasquan	20	18.0	S	1900's	Primary	1.0	.27	12.0	Atlantic O.	Rec.
Pt. Pleasant Beach	21	15.0	S	1928/61	Primary	1.5	.82	9.8	Atlantic O.	Rec.
Bay Head	22	6.0	S	1917/52	Primary	.50	.35	3.9	Atlantic O.	Rec.
Lavallette	23	5.0	S	1929	Primary	.87	.80	3.3	Atlantic O.	Rec.
Dover Twp. Ortley Beach	24	7.0	S	1965	Primary	2.55	1.10	4.5	Atlantic O.	Rec.

TABLE VI-2A

INVENTORY OF WASTE SOURCES
DISCHARGING INTO INTERSTATE WATERS OF
NEW JERSEY COASTAL BASIN, 1966 (Cont'd)

Waste Sources (arrayed from North to South)	Map Ident. No.	Max. Pop. Served (000)	Collection System	Year Built	Degree Treatment	Flow MGD		Est. BOD Discharged (PE, 000)	Receiving Waters	
						Des.	Act.		Name	Use
Seaside Hgts.	25	50.0	S	1928/61	Primary	1.7	1.5	33.0	Atlantic O.	Rec.
Seaside Park	26	35.0	S	1949	Primary	0.96	1.34	28.0	Atlantic O.	Rec.
Berkeley Twp. S.A. S. Seaside Park	27	.5	S	1966	Interm.	.44	.05	.1	Atlantic O.	Rec.
Surf City	28	15.0	S	1960	Primary	.72	.40	9.8	Atlantic O.	Rec.
Ship Bottom	29	20.0	S	1958	Primary	1.2	.40	13.0	Atlantic O.	Rec.
Long Beach Twp.	30	50.0	S	1949	Primary	2.0	1.3	33.0	Atlantic O.	Rec.
Beach Haven	31	15.0	S	1957	Primary	.60	.93	13.0	Atlantic O.	Rec.
Brigantine	32	25.0	S	1956	Interm.	1.0	3.5	12.0	Absecon Inlet	Rec.
Atlantic City (City Island)	33	250.0	S	1920/56	Primary	18.0	16.0	190.0	Beach Thoro.	Fish.
Atlantic City (Texas Ave.)	34	12.0	S	1920/56	Screening	-	.75	11.0	Beach Thoro.	Fish.
Pleasantville	35	25.0	S	1965	Secondary	2.0	1.3	5.0	Lakes Bay	Fish.

TABLE VI-2A

INVENTORY OF WASTE SOURCES
DISCHARGING INTO INTERSTATE WATERS OF
NEW JERSEY COASTAL BASIN, 1966 (Cont'd)

Waste Sources (arrayed from North to South)	Map Ident. No.	Max. Pop. Served (000)	Collection System	Year Built	Degree Treatment	Flow MGD		Est. BOD Discharged (PE,000)	Receiving Waters	
						Des.	Act.		Name	Use
Ventnor-Margate	36	55.0	S	1931	Primary	3.5	8.0	44.0	Beach Thoro.	Fish.
Longport (35th St.)	37	6.5	S	1928	Primary	0.5	0.6	4.5	Beach Thoro.	Fish.
Somers Point	38	7.0	S	1964	Secondary	1.0	0.5	1.4	Patcong Ck.	Fish.
Ocean City (3rd A.)	39	100.0	S	1900's	Primary	3.6	3.4	70.0	Great Egg Harbor	Fish.
Ocean City (46th A.)	40	25.0	S	1961	Secondary	1.0	0.5	5.0	Great Egg Harbor	Fish.
Sea Isle City	41	3.5	S	1900/57	Primary	.35	.35	2.5	Ludlam Bay	Fish.
Avalon Sewer Auth.	42	10.0	S	1955	Interm.	1.0	.80	3.0	Great Sound	Fish.
Stone Harbor Boro	43	10.0	S	1929	Primary	1.2	.85	6.5	Great Sound	Fish.
N. Wildwood City	44	30.0	S	1958	Primary	2.0	1.5	23.0	Hereford Inlet	Fish.
Wildwood City	45	50.0	C	1930	Primary	4.0	5.0	35.0	Post Ck. Basin	Fish.
Wildwood Crest	46	17.0	S	1961	Primary	1.9	1.5	12.0	Grassy Sd.	Fish.
Brisbane Child Center (Allaire)	51	.2	S	1955	Interm.	-	.016	.1	Manasquan R. Brisbane L.	Rec.

TABLE VI-2A

INVENTORY OF WASTE SOURCES DISCHARGING INTO INTERSTATE WATERS OF NEW JERSEY COASTAL BASIN, 1966 (Cont'd)

Waste Sources (arrayed from North to South)	Map Ident. No.	Max. Pop. Served (000)	Collection System	Year Built	Degree Treatment	Flow MGD		Est. BOD Discharged (PE, 000)	Receiving Waters	
						Des.	Act.		Name	Use
Howell Twp. Maxim Sewer Co.	55	4.0	S	1965	Interm.	.45	.20	.8	North Branch Metedeconk R.	Rec.
Lakewood Boro Lakewood W.Co.	56	12.5	S	1899/58	Secondary	1.9	2.0	6.3	South Branch Metedeconk R.	Rec.
Lakewood Twp. Leisure Village	58	.7	S	1964	Interm.	.30	.03	.1	Kettle Cr. Barnegat Bay	Rec.
Dover S. A. Toms R. Plant	60	4.0	S	1921/44	Primary	.35	.485	2.6	Toms River	Rec.
Island Hgts. Boro	61	3.7	S	1957	Secondary	.4	.14	.4	Toms River	Rec.
Berkeley Twp. (Clamming Cr.)	62	.5	S	1966	Interm.	.27	.07	.2	Clamming Cr. Barnegat Bay	Fish.
Tuckerton Mun.	64	7.0	S	1964	Interm.	.50	.24	1.4	Tuckerton Cr. Ltl. Egg Hbr. B.	Fish.
Stafford Twp. Mun.	63	7.0	S	1966	Secondary	.49	.27	.7	Mill Cr.	Rec.
Ltl. Egg Hbr. Twp. Mystic Isle Sew.	68	7.0	S	1962	Interm.	0.5	.24	1.4	Big Creek Great Bay	Fish.

TABLE VI-2A

INVENTORY OF WASTE SOURCES
DISCHARGING INTO INTERSTATE WATERS OF
NEW JERSEY COASTAL BASIN, 1966 (Cont'd)

Waste Sources (arrayed from North to South)	Map Ident. No.	Max. Pop. Served (000)	Collection System	Year Built	Degree Treatment	Flow MGD		Est. BOD Discharged (PE, 000)	Receiving Waters	
						Des.	Act.		Name	Use
Berlin Boro	69	3.0	S	1965	Interm.	.66	.25	.6	Tinkers Bay G. Egg Hbr. Bay	Rec.
Weymouth Twp. Belcoville Sec.	71	.4	S	1916	Primary	.60	.03	.2	South Branch G. Egg Hbr. R.	Rec.
Mays Landing Oakcrest School	72	1.8	S	1964	Interm.	.03	.011	.3	Gravelly Run. G. Egg Hbr. R.	Rec.
Dover Twp. Bd. Ed.	73	na	na	na	Primary	.04	na	na	Applegate Cv. Barnegat Bay	Fish.
Long Branch Plant#1	74	8.8	S	na	Primary	1.25	na	5.6	Atlantic O.	Rec.
Jackson Twp. Mun.#1	52	2.0	S	1961	Interm.	.15	.20	.8	North Branch Metedeconk R.	Rec.
Jackson Twp. Mun.#3	54	1.2	S	1963	Interm.	.3	.12	.4	South Branch Metedeconk R.	Rec.
Long Branch Plant#2	75	12.8	S	na	Primary	2.25	na	8.4	Atlantic O.	Rec.
Lacey Twp. N.J. Hwy.Auth.	76	.2^{e}	S	na	Secondary	.04	.02	.03^{e}	Cedar Cr. Forked R.	Rec.

TABLE VI-2A

INVENTORY OF WASTE SOURCES DISCHARGING INTO INTERSTATE WATERS OF NEW JERSEY COASTAL BASIN, 1966 (Cont'd)

Waste Sources (arrayed from North to South)	Map Ident. No.	Max. Pop. Served (000)	Collection System	Year Built	Degree Treatment	Flow MGD		Est. BOD Discharged (PE,000)	Receiving Waters	
						Des.	Act.		Name	Use
Lacey Twp. Forked R. Marina	77	na	na	na	Primary	.006	na	na	Forked R. Turtle Mill Cr.	Rec.
Cape May C. H. Middle Twp. S. A.	79	4.6	S	na	Primary	.10	na	1.6	Hereford Inlet	Rec.
Garden Lake Middle Twp.	80	na	S	na	Interm.	.02	na	na	Grassy Sound	Rec.
Hamilton Twp. A.C. Race Track	81	1.1	S	na	Primary	.033	na	7.0[a]	Babcock Cr. Gr. Egg Hbr. B.	Rec.
Hamilton Twp. Bd. Chosen Freeholders	82	na	na	na	Interm.	.625	na	na	W. Brook Gr. Egg Hbr. B.	Rec.
Wall Twp. Allenwood Hosp.	85	.2	S	1936/59	Interm. without Cl_2	.035	.016	.1	Manasquan R.	Rec.
Galloway Twp. N.J. Hwy. Auth	87	5.6	S	na	Secondary	.030	.054	1.0[e]	Nacote Cr. Mullica R.	Rec.
Longport (14th S.)[b]	88	na	na	na	Primary	.04	na	na	Beach Thoro Risley Chan.	Rec.
Wall Twp. N.J. Hwy. Auth	89	2.0	S	na	Secondary	.03	.02	.2	Tirb. to Shark R.	Rec.

TABLE VI-2A

INVENTORY OF WASTE SOURCES DISCHARGING INTO INTERSTATE WATERS OF NEW JERSEY COASTAL BASIN, 1966 (Cont'd)

Waste Sources (arrayed from North to South)	Map Ident. No.	Max. Pop. Served (000)	Collection System	Year Built	Degree Treatment	Flow MGD		Est. BOD Discharged (PE, 000)	Receiving Waters	
						Des.	Act.		Name	Use
Ocean Twp. Middlebrook	90	na	S	1964	Interm.	.1	.07	10.0	Hog Swamp Cr. Harvey's Bk.	Rec.
Hamilton Twp. M.A.	83	na	na	na	Secondary	.625	na	-	Ludlam Bay	Rec.
FEDERAL										
Camp Evans Fort Monmouth	91	.2	S	1942	Primary^c	0.5	0.03	.02	Shark River	Rec.
Lakehurst Air Naval Sta.	92	3.0	S	1941	Primary^d	.05	0.2	20.0	Toms River Ridgeway Br.	Rec.
Ft. Hancock Middleton Twp.	1	1.0	S	1940	Primary	.55	.085	.6	Atlantic O.	Rec.

INDUSTRIAL - See Table VI-2B

N.B. = All but one municipal treatment plant provide chlorination.
a = Data from 1962 FWPCA Inventory.
b = N. J. S. D. H. 1966 Stream Pollution Control Program.
c = Plant has secondary facilities, but due to low flow was only primary.
d = Funded for FY '68 Secondary Plant.
e = Estimated.
S = Separate Sewer Systems.
C = Combined & Separate Sewer Systems.
Na = Data Not Available.
* = All underlined waste sources denote seasonal overloading.

Map identification numbering is arranged by stage of treatment and is not in numbered sequence.

TABLE VI-2B

INVENTORY OF INDUSTRIAL WASTE SOURCES DISCHARGING INTO INTERSTATE WATERS OF NEW JERSEY COASTAL BASIN, 1966

Waste Sources	Location	No. Emp. (00)	SIC	Mfg. Process	Discharge To	Type Waste	Type Treatment	Flow	PE-BOD (000)	Other Waste Characteristics (00)	Remarks
Toms R.Chem. Corp. 94	Toms R.	1.0	2815	dyes, resins, plastics	Atlantic Ocean	Process: NaCl, $CaSO_4$, $MgSO_4$	Process: pH Neutralization Basin, 2 clarifiers Cooling: None Domestic: Primary settling with discharge into pH Neutralization Basin.	6 MGD	19.0	25 Units of color 2 degree temp rise	Designed for 15 MGD has 65 mg reservoir for domestic wastes during periods of temperature stratification breakdown at the ocean outfal

TABLE VI-3

INVENTORY OF WASTE SOURCES
DISCHARGING INTO INTRASTATE WATERS OF
NEW JERSEY COASTAL BASIN, 1966

Waste Sources (arrayed from North to South)	Map Ident. No.	Max. Pop. Served (000)	Collection System	Year Built	Degree Treatment	Flow MGD		Est. BOD Discharged (PE,000)	Receiving Waters	
						Des.	Act.		Name	Use
MUNICIPAL AND INSTITUTIONAL										
Southern Freehold Reg. H. S.	50	.3	S	1964	Interm.	.064	.01	.1	Manasquan R.	Rec.
Jackson Twp. Mun. #2	53	1.0	S	1962	Interm.	.15	.10	.2	Metedeconk R. South Branch	Rec.
Jackson Twp.-Harmony Sew. Co.	57	.7	S	1962	Interm.	.14	.05	.1	South Branch Metedeconk R.	Rec.
Freehold Boro	47	10.0	S	1958	Secondary	0.8	0.65	2.3	Debois Cr. Manasquan R.	Rec.
Freehold Sew. Co.	48	1.1	S	1964	Secondary	0.3	0.20	.1	Passaquanaco Manasquan R.	Rec.
Wynnewood Sew. Co.	49	1.0	S	1961/64	Interm.	0.24	0.12	.5	Manasquan R. Passaquanaco Br.	Rec.
Lakehurst Mun.	59	1.5	S	1954/63	Secondary	0.50	0.12	.2	Manapague Cr.	Rec.
Ancora St. Hosp.	65	2.5	S	1961	Secondary	1.2	.24	.3	Blue Anchor Br. Mullica R.	Rec.
Hammonton Mun.	66	6.0	S	1966	Secondary	1.2	.7	.7	Hammonton Cr. Mullica R.	Rec.

TABLE VI-3

INVENTORY OF WASTE SOURCES DISCHARGING INTO INTRASTATE WATERS OF NEW JERSEY COASTAL BASIN, 1966 (Cont'd)

Waste Sources (arrayed from North to South)	Map Ident. No.	Max. Pop. Served (000)	Collection System	Year Built	Degree Treatment	Flow MGD		Est. BOD Discharged (PE,000)	Receiving Waters	
						Des.	Act.		Name	Use
Egg Harbor City	67	4.5	S	1953	Secondary	1.0	.3	.3	Landing Cr. Mullica R.	Rec.
Monroe Mun. Williamstown	70	4.6	S	1961	Secondary	.45	.35	.9	Trib. to Gr. Egg Harbor R.	Rec.
Dennis Twp. N.J. Hwy. Auth.	84	2.0	S	na	Secondary	.03	.02	.2[e]	Trib. to Ludlam Bay	Rec.
Lakewood Mary Knoll School	86	.2	S	na	Interm.	na	na	.04	Metedeconk R. S. Branch	Rec.
FEDERAL FACILITY										
Pamona NAFEC	93	2.0	S	1943	Secondary	.21	.15	.4	Gr. Egg Hbr. R.	Rec.

e = Estimated
S = Separate sewer system
Na = Data not available

Map identification numbering is arranged by stage of treatment and is not in numbered sequence.

VII - DESCRIPTION OF THE REGION

LOCATION

The New Jersey Coastal Region is located in eastern New Jersey between Sandy Hook and Cape May. The Region forms a crude triangle, whose length along the Atlantic coast is about 120 miles and whose greatest width is about 40 miles. The total land area amounts to about 1,830 square miles. The Region also includes the coastal and intracoastal waters.

GEOLOGY

The entire Region lies within the Atlantic Coastal Plain, which consists of a southeastward-thickening wedge generally composed of unconsolidated sands, gravels, clays, silt, and marls of the Cretaceous and Tertiary Ages. The wedge declines southeastwardly at about 50 feet per mile. The coarser beds of these deposits contain considerable volumes of groundwater.

HYDROLOGY

Southern New Jersey has an average annual precipitation of 45 inches with about 3.6 inches falling each month.

Although precipitation during drought conditions may be only a third or half of the maximum monthly rainfall, the stabilizing effect of groundwater storage in the Coastal Plain results in noticeably greater sustained dry season flows at the headwaters of the Batsto and Toms Rivers.

Surface waters in the Region drain to the Atlantic Ocean, mainly via the sounds and bays of the intracoastal waterway. Average discharge for the 21 percent of the Region gaged is 723 cfs.

The New Jersey coastal estuaries are characterized by very restricted inlets, or connections with the ocean. The average depth over the inlet barrier bars varies from three to five feet (except over those at the Cape May and Little Egg Inlets). On many occasions, breakers make these bars impassable to boats. The greatest tidal current velocities occur in the inlets and may reach three knots.

The northern estuaries, inside the inlets, are relatively broad and shallow, and their normal tidal current pattern and range may be greatly modified by the wind. In Barnegat Bay, for example, normal tidal range is about half a foot away from the inlets, as compared with four feet on the ocean side of the barrier. During strong winds of long duration, however, the tidal range may vary by as much as three feet above and below normal maximum levels. Southern estuaries are characterized by relatively narrow, twisting channels connecting shallow, sedgy sounds. The narrowness of these channels restricts circulation.

A dye study in Barnegat Bay by Carpenter (1965) indicated a residence time of roughly five days, a tidal excursion of about one mile, and a typical velocity of several tenths of a knot. Federal Water Pollution Control Administration studies made in 1966 found elliptical particle trajectories over a tidal cycle and appeared to confirm Carpenter's speed and excursion values. Tidal action provides most of the energy for the normal circulation, although water from Toms River contributes to a general southerly drift.

New Jersey Department of Health and FWPCA studies carried out south of Atlantic City from 1960 to 1967 show tidal excursions of about 2.5 miles near the inlets in the larger bays and sounds and about 1.5 miles in the more restricted sounds and channels well away from the inlets.

Immediately outside the inlets, the major sand transport is northward along the coast. Drift bottle studies (Bumpus and Lauzier, 1965) show that a combination of eddies, tidal currents and drift exert a shoreward component of current during the summer bathing season. Sea bed drifter returns suggest bottom currents with a shoreward component of several tenths of a mile per day (Bumpus, 1955).

SOCIO-ECONOMIC CHARACTERISTICS

Population in the New Jersey Coastal Region was 506,278 in 1960, the year of the last complete U. S. Census. By 1965, the population was estimated to have increased to 603,700 or about 19 percent above 1960. These estimates show the recreation-rich Region has grown about half again as fast as the State as a whole. Elaborate, well-planned water supply and wastewater control programs must be developed and administered throughout the New Jersey Coastal Region or its water resources will be degraded and the growth rate indicated above will not be maintained.

It is presently estimated that the region's population will advance 137 percent during the 1960-1990 period to 1,200,000. The interaction of various growth factors, some of which are directly related to the steady rise in leisure time, may eventually mean that past population projections have been too conservative.

The distribution of the population by county in the New Jersey Coastal Region for the period under discussion is outlined in Table VII-1.

Four counties, Monmouth, Ocean, Atlantic, and Cape May, commonly referred to as the "Jersey Shore", account for more than 90 percent of the Region's total population. Ocean County registered the highest population increases, approximately 33 percent during the five year period, 1960-1965. More than three-quarters of the inhabitants in the Region live in the cities and other municipalities fronting the Atlantic or located along the coastal bays and inlets. The remainder of the inhabitants live in communities on the upper reaches of the coastal streams, in the pinelands, and in other rural areas.

An internationally famous resort area, the "Jersey Shore" attracts millions of tourists and vacationers throughout the year. During the summer season the population swells to more than triple its winter size. Table VII-2 illustrates the enormous influx of summer visitors to several typical resort centers. This seasonal variation underscores the importance of tourist trade to the Region's economy and points up the tremendous strain imposed upon all forms of public facilities during the summer season. It should be noted that the summer population gain of 439,990 for the five resorts listed in Table VII-2 is larger than the total resident population (371,880) of the three counties in which they are located. There are many other resort communities in the Region which experience equally dramatic increases in summer population.

An analysis of the employment patterns (wage and salary employment covered by Social Security) in the Region also characterize it as a leading resort. More than half of the employed are engaged in trade and service activities. Even in mid-March, the date of Census employment enumeration, these counties provided 47 percent of the State's total employment in hotels, motels and other lodging places although having only five percent of the State's resident population. Summer employment at these facilities rises significantly to accommodate the needs of the thousands of guests visiting the "Jersey Shore".

Employment in the Region is growing faster than in the State as a whole. Although total employment in New Jersey advanced 13 percent between 1956 and 1964, employment in the four counties increased 37 percent, almost triple the State rate. The Region accounted for only seven percent of the State's total covered employment, but in several major employment sectors it had a relatively high percentage of the State total. Such sectors include: agricultural services, forestry and fisheries, 26 percent of the State total; contract construction, 14 percent; services, 11 percent and retail trade, 12 percent.

Another economic measure demonstrating the attraction of the "Jersey Shore" as a vacation and recreation area is the proportion of seasonally vacant housing units within its outline. With only 15 percent of the State's total housing units, the four major counties contained over 70 percent of New Jersey's total seasonally vacant housing units.

TABLE VII-1

DISTRIBUTION AND PROJECTION OF POPULATION IN THE NEW JERSEY COASTAL REGION, BY REGION AND COUNTY, 1960 AND 1990

Region and County	County Population 1960	HCMC Project % Population 1960	New Jersey Coastal Region % Population 1960 [2]	New Jersey Coastal Region Population 1960	New Jersey Coastal Region Population 1990
NEW JERSEY COASTAL REGION TOTAL		2.6 [1]		506,278	1,162,600
Atlantic	160,000	99.0	100.0	159,286	251,600
Burlington	224,499	2.1	100.0	4,798	10,400
Camden	392,035	5.4	100.0	21,128	34,800
Cape May	48,555	80.3	100.0	38,990	64,000
Gloucester	134,840	5.8	100.0	7,835	16,300
Monmouth	334,401	99.0	51.4	170,226	441,500
Ocean	108,241	96.1	100.0	104,015	344,000

[1] Total 1960 HCMC Project Population - 19,292,000

[2] Refers only to the New Jersey Coastal portion within HCMC Project

Source: U. S. Bureau of the Census; New Jersey Department of Conservation and Economic Development.

TABLE VII-2

SEASONAL POPULATION CHANGES AT SELECTED NEW JERSEY COASTAL REGION COMMUNITIES

1964

Resort	Normal Population	Summer Population	Net Gain	Percent Increase
Atlantic City	60,400	210,000	149,600	248
Ocean City	7,730	150,000	142,270	1,840
Wildwood City	4,680	125,000	120,320	2,571
Ship Bottom	750	16,000	15,250	2,033
Surf City	450	13,000	12,550	2,789
TOTALS	74,010	514,000	439,990	9,481

Source: New Jersey State Navigation Bureau.

VIII - WATER USE

WATER SUPPLY

Present Demands

The following information on present water supply systems in the New Jersey Coastal Region is based chiefly upon an inventory of municipal and institutional waterworks made by project personnel during the summer of 1966, supplemented by data from the 1963 Public Health Service Municipal Water Facilities Inventory.

Within the Region, 70 known municipal and institutional water supply systems serve a winter population of some 515,400 persons, with an average consumption of 55 MGD or 107 gallons per capita. These same systems serve a summer population of 1,264,000, with an average consumption of 114 MGD or 91 gallons per capita. Of these systems, 68 rely solely on ground water. The Monmouth Consolidated Water Company, serving an estimated population of 198,000, uses surface source as its supply. During the summer period of high demand, Atlantic City finds it necessary to maintain a supplemental surface water source.

In general, most of the municipal and institutional water supply systems in the Region are small. During the winter only the Monmouth Consolidated Water Company (19.5 MGD) and the Atlantic City Municipal works (10.0) supply more than 2.0 MGD, and only nine others supply as much as 1.0 MGD. During the summer, 13 works supply 2.0 MGD or more and 12 others supply between 1.0 and 1.9 MGD. Known data are presented in Table VIII-1.

Industrial water use in the New Jersey Coastal Region is estimated to be about 15 MGD and is generally supplied by the municipal systems. The only major self-supplied industry in the Region, the Toms River Chemical Corporation, uses about 5 MGD of ground water for processing purposes and an additional 13 MGD of water from the Toms River for cooling.

According to the U. S. Census, there are nearly 58,670 rural domestic water supply sources (individual wells and other systems) located throughout the Region. It is estimated that these systems supply approximately 184,770 persons. Ground water is the primary source for these supplies.

Some water is used for crop irrigation in the Region. The acreage under irrigation is increasing annually, and the amounts of water used are believed to be significant relative to those used for domestic purposes. The major portion of crop irrigation water is taken from streams.

Future Requirements

The following estimates of future water supply needs in the New Jersey Coastal Region are based upon population projections as outlined in Section VII of this Report, the present per capita water consumption, and trends in the per capita water consumption for New Jersey as reported by the Senate Select Committee on Water Resources.

Average daily water consumption in the Region in 1966 is estimated as 107 gallons per capita in winter. It is projected that by the year 1990 this usage will have increased to approximately 115 gallons per day, 76 percent of which is attributed to domestic, commercial and other public use with the remaining 24 percent allocated to industrial use. This distribution of the projected 1990 per capita water use can vary markedly depending upon the dynamics of growth and demand registered by industry and all other users. Technological advances in home appliances, and changing recreational uses and commercial demands may accelerate the projected upward trend towards more liberal water use patterns.

It is estimated that by 1990 the total water supply needs of the resident population in the New Jersey Coastal Region will amount to 133 MGD, with 102 MGD for domestic, commercial and other public use and the balance for industrial requirements. This increased consumption represents a gain of almost 50 percent above current water usage.

The summer months water supply needs are expected to reach 372 MGD by 1990 with the largest share of the demand going to commercial establishments: hotels, motels and other resort facilities. These will raise the domestic, commercial and all other categories to 306 MGD, with industry using roughly the same amount of water in the summer as in the winter. The summer agricultural demand in 1990 is roughly estimated at 35 MGD.

Future needs (1990) can be met by the continued preservation and enhancement of the Region's surface water and by greater development of the large ground water sources. The amount of ground water available in the Region has been estimated to exceed one billion gallons per day, more than enough to meet the Region's requirements as well as to supplement the needs of adjacent areas.

There are several relatively large surface streams in the area that may, if properly enhanced and developed, serve as primary or supplementary water sources. Among those which might be considered for development are the Mullica-Wading River drainage basin, the Manasquan River basin, and the Metedeconk River drainage basin. State and local action has been taken recently to develop the Manasquan River as a primary water source.

The discharge from the municipal facilities which have inadequate, overloaded and inefficient treatment processes can degrade surface waters and render them unusable as a water supply source. The immediate corrective action outlined earlier in this report must be effected in order that the water quality of these streams can meet the standards of future water supply development.

RECREATION

The waters of the New Jersey Coastal Region are used intensively for such recreational activities as bathing, boating and sportfishing. The extent of recreational use is indicated in Tables VI-2 and VI-3 in another Section of this Report.

Bathing

Recreational bathing is a major water use in much of the Region. Bathing beaches and facilities are located along the ocean front and portions of the intracoastal waterway. In 1964, public beach usage amounted to 59,000,000 visitor-days, fairly evenly distributed among the four resort counties. This estimate does not include the use of beaches by residents of the numerous cottage communities fronting the ocean and intracoastal waterway.

Recreational Boating

Recreational boating is widespread throughout the area, particularly in the intracoastal waterway. There are 228 marinas in the Region, two-thirds of which are located in the Great Bay vicinity or to the north, and many cottages have their own boat slips. The increasing interest in boating is evidenced by the large number of lagoon communities being constructed around the perimeter of Barnegat Bay and elsewhere along the waterway. A major attraction for the boating enthusiast is the intracoastal waterway itself, along which boats drawing less than four feet can cruise in protected waters from Manasquan Inlet to Cape May Inlet (and south via canal and Delaware Bay to the National Intracoastal Waterway beyond). Many cabin cruisers hailing from Long Island Sound, the Hudson Estuary, and Delaware and Chesapeake Bays visit the Region during the boating season.

In 1965 more than 86,300 outboard motor boats of greater than 10 horsepower were registered in the State of New Jersey. About 100,000 smaller unregistered outboards were also based in the State. Approximately 10,000 outboards are presently sold in New Jersey each year and sales are increasing.

The development of marinas and associated facilities (110 launch ramps and 18,000 marina berths are presently in the New Jersey Coastal Region) to meet present and future recreational boating needs will result in greater pollution unless closer regulatory and surveillance activity is provided.

Sport Fishing

The Jersey Coastal Region is one of the principal sport fishing centers in the Nation. Because of its proximity to the New York Metropolitan area and the excellent topographic features occurring all along its periphery, sport fishing is an unusually popular activity. Probably the most desirable area along the coast is that starting on the north at Sandy Hook and running south to Mantoloking. Here one can find the greatest number of facilities and the longest fishing season. In this area are some of the largest fleets of charter and party boats leaving eastern ports. Throughout the Coastal Region are some 38,000 private craft, many of which at some time or other, enter into sport fishery, along with the many out-of-state craft that fish New Jersey waters. In addition to the large number of private craft there are hundreds of commercial, charter and party boats, and more than 5,000 rowboats for hire.

There are several major party and charter boat basins along the Jersey Coast, which include: Belmar, Brielle, Point Pleasant, Forked River, Waretown, Barnegat City, Beach Haven, Oyster Creek, Mott's Creek, Atlantic City, Ocean City, Wildwood, Cape May, Townsends Inlet, Reed's Beach and Mott's Landing.

The most frequently fished species caught by party boats are porgy and sea bass. Party boats range in size from 26 foot cabin cruisers to 110 foot converted sub chasers. The more frequently used crafts are those under 15 net tons.

Charter boats are larger cabin cruisers, range from 26 to 45 feet and are distinguished by their tremendous outriggers. These boats troll the ocean up to 12 miles at sea, or even further in some cases, seeking tuna, bluefish (most frequently caught species), albacore, and striped bass.

Waterfowl

The New Jersey Coastal Region has wetlands of especially high value to waterfowl along the Mullica River and the waterways south to the Great Egg River. From about Forked River in Barnegat Bay south to Cape May the remaining wetlands are of at least moderate value. Particularly large numbers of waterfowl are found in these areas, with black ducks and brant being most common. The birds attract many resident and nonresident hunters in season.

COMMERCIAL FISHING

Shellfishing

In 1956, the shellfish harvest in the New Jersey Coastal Region accounted for 40 percent of New Jersey's output, and had a dockside value of $5.7 million. In 1965, this Region contributed more than 85 percent of the State's total shellfish catch valued at $6.5 million. This increased contribution in the Coastal Region to the State's total shellfish take is due to the increasing harvest of the surf clam, a mollusk found in unpolluted moderately deep ocean waters. In contrast to the accelerated harvest of surf clams, the landing value of hard clams, soft clams and oysters in New Jersey declined from $3.7 million in 1956 to $1.6 million in 1965. Hence, although the New Jersey shellfish industry has shown a moderate gain of 14 percent in value of output in the period selected for study (1956-1965), the harvest of hard and soft clams and oysters has declined markedly. The decline is attributed to pollution and natural disease.

Finfishing

Commercial finfishing is an important industry in this Region. Although the finfishing industry in New Jersey as a whole has slumped sharply, the Coastal Region reported an advance of approximately 57 percent, from $2 million to $3.1 million, during the period from 1956 to 1965. In relative shares of the State's total catch, the Region now accounts for more than two-thirds of the total finfish harvest as compared with one-fifth ten years earlier.

TABLE VIII-1

INVENTORY OF MUNICIPAL WATER FACILITIES
NEW JERSEY COASTAL REGION

	Population Served		Consumption (MGD)	
Facility	Winter	Summer	Winter	Summer
Atlantic County				
Atlantic City (Mun.)	59,684	125,000	10.00	20.00
Atlantic County W. Co.	na	38,000	1.80	5.60
Brigantine City Water Dept.	5,000	15,000	0.51	1.13
Egg Harbor City	4,000	4,000	.35	.50
Hamilton Twp. Auth.	4,500	4,500	.25	.25
Hammonton Town	7,800	na	.9	2.0
Longport Boro	1,070	6,500	.25	.80
Margate City	9,500	na	1.0	2.0
Atlantic County Mental Hosp.	300	na	.04	.09
Ventnor City	10,000	15,000	1.07	2.35
Total Atlantic County	101,854	208,000	16.17	34.72
Cape May County				
Avalon Boro	1,000	10,000	.15	1.2
Cape May Mun.	7,500	25,000	.70	2.1
Lower Twp. W. Co.	na	na	na	na
Crest Haven Welfare Home	135	135	.01	.01
Neptunus W. Co.	2,000	2,000	.18	.18
Ocean City W. Co.	10,000	125,000	1.0	5.2
Sea Isle City Mun.	1,500	15,000	.25	1.0
Stone Harbor Mun.	900	15,000	.45	.85
Corson's Inlet W. Co.	50	250	.08	.12
Wildwood Mun.	15,000	150,000	1.0	7.40
N. J. State Colony Woodbine	1,800	1,800	.2	.2
Woodbine W. Co.	na	na	.3	.9
Total Cape May County	39,885	344,185	4.32	19.16
Ocean County				
Barnegat Light Mun.	350	4,000	.08	.35
Bay Head	1,500	20,000	.400	1.65
Beachwood Boro	2,700	6,000	.10	.18
Beach Haven Boro	2,500	15,000	.2	1.0
Shore W. Co.	150	4,500	.06	.16

TABLE VIII-1

INVENTORY OF MUNICIPAL WATER FACILITIES NEW JERSEY COASTAL REGION (Cont'd)

Facility	Population Served		Consumption (MGD)	
	Winter	Summer	Winter	Summer
Ocean County (Cont'd)				
Berkeley W. Co.	500	500	na	na
Bayville W. Co.	210	210	.03	.03
Arlington Beach Co.	0	500	.04	.12
Toms River W. Co.	23,400	na	1.90	1.90
Harvey Cedars Boro	200	4,500	.06	.31
Island Heights Boro	2,700	3,700	.18	.30
Long Beach Twp.	200	700	.05	.15
Long Beach W. Co.	3,000	40,000	.25	1.50
Mystic Island W. Co.	1,200	7,000	.08	.45
Lavallette Boro	1,800	1,800	.15	.80
Lakewood (Leisure Vill.)	690	690	.03	.14
Lakewood W. Co.	11,000	11,000	1.0	1.2
Lakehurst Boro	3,000	3,000	.12	.30
Jackson Twp. Auth.	5,000	5,000	.60	.70
Cedar Glen City	900	900	.10	.10
Point Pleasant Beach Boro	4,000	15,000	.60	2.00
Point Pleasant Boro	13,000	13,000	1.50	2.50
Pine Beach W. Co.	800	800	.10	.10
Ocean Gate Boro	1,000	5,000	.09	.30
Ship Bottom	1,500	20,000	.20	.79
Seaside Park Boro	1,000	35,000	.10	1.62
Seaside Hgts. Boro	3,600	100,000	.30	2.89
Tuckerton Boro	300	6,000	.04	.50
Surf City Boro	1,000	15,000	.10	.67
Stafford Twp.	500	7,000	.10	.28
Total Ocean County	87,700	345,800	8.56	22.99
Monmouth County				
Wall Twp.	15,900	na	.75	1.50
Brisbane Child Care Cen.	175	175	.02	.02
Monmouth County Hosp.	177	177	.02	.02
South Belmar	-	-	Distribution only	
Belmar Boro	9,000	35,000	.60	1.30
Spring Lake Heights Boro	5,000	8,000	.25	.50
Spring Lake Boro	3,000	12,000	.29	1.20
Sea Girt Boro	2,000	3,000	.22	.70
Howell Twp.	4,800	4,800	.28	.50
Manasquan Boro	5,000	18,000	.33	.95

TABLE VIII-1

INVENTORY OF MUNICIPAL WATER FACILITIES
NEW JERSEY COASTAL REGION (Cont'd)

Facility	Population Served		Consumption (MGD)	
	Winter	Summer	Winter	Summer
Monmouth County (Cont'd)				
Freehold Twp.	400	400	.02	.07
Freehold Twp.	4,000	4,000	.23	.23
Freehold Boro	10,000	10,000	.92	.92
Farmingdale	1,030	1,030	.07	.08
Brielle Boro	4,000	5,500	.25	.40
Avon-By-The-Sea	4,200	13,500	.22	.80
Asbury Park City	18,500	18,500	2.1	5.5
Allenhurst	800	2,000	.15	.20
Monmouth Consolidated W. Co.1/	198,000 E	230,000 E	19.50	22.70
Total Monmouth County	285,982	366,082	26.22	37.59
GRAND TOTAL	515,421	1,264,067	55.27	114.46

1/ Derives supply from surface waters of another region (Metropolitan New York) but services many residents in this region.

E = Estimated
na = Data not available

Source: 1963 Public Health Service Inventory
1966 FWPCA Inventory (unpublished)

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APPENDICES

APPENDIX A

CRITERIA FOR PRIORITY DETERMINATION

A system of priority ranking was developed for municipal and industrial construction needs, based on a series of criteria which indicate the urgency of abatement for each waste source. These criteria, which are in the form of a weighted scoring system, were applied to each known waste source. All sources were then ranked on the basis of final score, and divided into four priority groups, on the basis of engineering and economic judgment.

The criteria used to evaluate and rank the municipal treatment needs are presented in Table A-1. The scoring system includes such factors as existing treatment type, BOD loading discharged, size and use of the receiving stream, and previous enforcement activity.

A separate set of criteria which recognize the variation in industrial waste characteristics, were developed to rank industrial needs by priority. These criteria, shown in Table A-2, include such factors as waste toxicity, solids and color in addition to the factors used for municipal waste.

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TABLE A-1

PRIORITY CRITERIA - MUNICIPAL WASTES

Aggregate Weight Adjusting Factors

		Percent
I	Type of Treatment	35
II	Population Equivalents (P.E.)-Discharged (BOD)	25
III	Receiving Water Use and Dilution	35
IV	Prior Orders Issued	5

Enumerated Categories by Weight

I.A Type of Treatment

Bases	Wt.
No Treatment	100
Primary - No Chlorine - Overloaded	90
Primary - Chlorine - Overloaded	80
Primary - No Chlorine - Within design	70
Primary - Chlorine - Within design	60
Intermediate - No Chlorine - Overloaded	80
Intermediate - Chlorine - Overloaded	70
Intermediate - No Chlorine - Within design	50
Intermediate - Chlorine - Within design	40
Secondary - No Chlorine - Overloaded	70
Secondary - Chlorine - Overloaded	60
Secondary - No Chlorine - Within design	30
Secondary - Chlorine - Within design	0

II.A P. E. Discharged

BOD Range	
0 - 100	5
100 - 1000	10
1000 - 10,000	25
10,000 - 100,000	50
Over 100,000	100

III.A Receiving Water Use and Dilution

A Use

Drinking Water	80
Shell Fishing and/or Recreation	38
Sport Fishing	25
Other Uses	10

B Dilution

Large	0
Medium	15
Small	50

TABLE A-1 (CONT'D.)

IV.A Prior Orders Issued

	Wt.
Yes	100
No	0

TABLE A-2

PRIORITY CRITERIA - INDUSTRIAL WASTES

Aggregate Weight Adjusting Factors

		Percent
I	Effluent Waste Characteristics	30*
II	Volume of Wastes	30
III	Receiving Water Use and Dilution	40

Enumerated Categories by Weight

I	**Effluent Waste Characteristics***	Percent of Wt.
A.	Bacteria	
	less than 1 x 10^5 total coliform/100 ml	5
	between 1 x 10^5 to 1 x 10^6 total coliform/100 ml	20
	greater than 1 x 10^6 total coliform 100 ml	30
B.	BOD	
	less than 20 mg/l	0
	20 - 100 mg/l	5
	100 - 300 mg/l	10
	300 - 600 mg/l	15
	greater than 600 mg/l	20
C.	Color and/or foam	
	if significant in stream	5
D.	Floating Solids - oil, grease	
	if significant in stream	10
E.	pH	
	less than 5 or greater than 10	5
F.	Temperature rise	
	greater than 5°F in stream	10

TABLE A-2 (CONT'D.)

G. Total Suspended Solids

less than 75 mg/l	0
75 - 200 mg/l	10
greater than 200 mg/l	20

H. Toxic Chemicals

toxic to fish in stream	50

*It can be noted that on the basis of the percent of weight, that the total weight of 30 can be exceeded. This is necessary in order to develop the proper priority when considering highly significant waste characteristics.

II A. Volume of Wastes

Item			Percent of Wt.
1,000	-	10,000 gal. per day	10
10,000	-	100,000 gal. per day	20
100,000	-	1,000,000 gal. per day	50
1,000,000	-	5,000,000 gal. per day	100
greater than 5,000,000 gal. per day			150

III Receiving Water Use & Dilution

	Percent of Wt.
A. Use	
Drinking Water	80
Shell Fishing and/or Recreation	38
Sport Fishing	25
Other	10
B. Dilution	
Large	0
Medium	15
Small	50

APPENDIX B

CONSTRUCTION ACTIVITY CODING

Two basic assumptions were used throughout in determining construction needs. Minimum acceptable treatment was defined as secondary treatment for municipal waste or its equivalent for industrial waste. All existing treatment plants constructed more than 20 years ago were considered obsolete and in need of complete replacement.

A system of construction coding was formulated to indicate the kind and amount of construction activity required to abate each municipal and industrial waste discharge. Each source was coded by an activity as shown in Tables B-1 (Municipal) or B-2 (Industrial).

TABLE B-1

MUNICIPAL CONSTRUCTION ACTIVITY CODES

Type of Facility	Status of Waste Source	Code Number
No Plant	Discharging raw sewage-build primary and secondary plant	01
Primary Plant	Not suitable for upgrading to secondary, build a new secondary plant	02
	Suitable for upgrading to secondary, if overloaded build secondary for overload	04
Intermediate Plant	Not suitable for upgrading to secondary, build a new secondary plant	03
	Suitable for upgrading to secondary, if overloaded build secondary for overload	05
Secondary Plant	Condition Good - if overloaded build secondary for overload only	06
	Condition Fair to Poor - if not overloaded continue to use	07
	Condition Fair to Poor - If overloaded build new secondary for total load	08
Any Plant or No Plant	Do not build or reconstruct, plant to be shut down and load picked up by another plant (load has been added to other unit)	09
	Replace septic tanks with new plant and collection system	10

TABLE B-2

INDUSTRIAL CONSTRUCTION ACTIVITY CODES

Code Number	Type of Activity
A	Provide secondary treatment or equivalent, including chlorination
B	Provide secondary treatment or equivalent
C	Provide for segregation and separate treatment of one or more types of waste that may include suspended solids, toxic matter, oil and/or grease, color and high or low pH
D	Same as C; plus biological treatment for all or part of the wastes, including chlorination

APPENDIX C

COST ESTIMATING PROCEDURES

Estimated costs of needed municipal construction activities were developed, using as a basis an unpublished study of sewage treatment needs in the Hudson River basin above Chelsea, New York.[1] This study presented a sliding scale of unit cost by population served and by type of construction required.

In developing cost estimates, it was recognized that waste treatment facilities constructed in the immediate future should be designed for anticipated population growth through 1990, to allow for a plant life of 20 years. However, since no data are available to provide reasonable projections of sewered population on an individual plant basis, estimates were prepared for the region as a whole and then adjusted to reflect the needed additional capacity.

A basic cost was calculated for each municipal plant, using the present population served, the needed construction activity and the unit cost data. The results were summed for each priority and construction activity code and corrected by the FWPCA construction cost index projected to 1970. A 20 percent factor was then added to cover engineering, legal and other services, after which the cost estimates were revised to reflect the anticipated regional growth through 1990. Cost estimates for ancillary works, such as interceptor sewers, pumping stations and force mains were calculated as 83 percent of the treatment plant cost, based on the Study referred to above.

Industrial cost estimates were prepared by assuming equivalency between the costs of industrial and municipal plants to treat the same magnitude of organic loadings, expressed in terms of population equivalents, with the results projected to 1990 on the basis of anticipated growth of industrial water use. Ancillary works, such as process changes and segregation of wastes, were estimated as 50 percent of the treatment plant cost.

1/ Basic Data Branch, DWSPC, Public Health Service (now Division of Pollution Surveillance, Technical Programs, FWPCA) August 10, 1965, Subject "Sewage Treatment Needs in Hudson River Basin above Chelsea"

RULES AND REGULATIONS

* * *

REGULATIONS ESTABLISHING CERTAIN CLASSIFICATIONS TO BE ASSIGNED TO THE WATERS OF THIS STATE AND STANDARDS OF QUALITY TO BE MAINTAINED IN WATERS SO CLASSIFIED.

WHEREAS, Chapter 12 of Title 58 of the Revised Statutes of New Jersey (N.J.S.A. 58:12-3) provides that no plant for the treatment of domestic or industrial wastes or other polluting substance, from which the effluent is to flow into any of the waters of this State, shall be constructed except under such conditions as shall be approved by the State Department of Health, and

WHEREAS, The conservation of the quality and function of the waters of the streams of this State into which effluents from sewerage facilities are discharged and the minimizing of pollution of these waters is the over-riding consideration of the Department of Health of the State of New Jersey in its considerations of the approvals of designs for such treatment works, and

WHEREAS, The maintenance of reasonable quality of the waters of the streams of this State is the primary basis upon which the State Department of Health approves of the design of proposed sewerage facilities, and

WHEREAS, The Interdepartmental Committee on Stream Pollution Control Problems, established by the State Commissioners of Health and Conservation and Economic Development, on April 9, 1964, recommended certain classifications be assigned to the waters of this State and standards of quality to be maintained in waters so classified, be promulgated as regulations by the State Department of Health, and

WHEREAS, The State Department of Health has determined that classifications of the waters of this State and standards of quality to be maintained in such waters as proposed and recommended by the Interdepartmental

Committee on Stream Pollution Problems in this State are reasonable and constitute a valuable administrative instrument to the Department in the administration of the New Jersey Stream Pollution Control Program,

NOW THEREFORE, The State Department of Health, pursuant to authority vested in it, promulgates the following regulations establishing certain classifications to be assigned the waters of this State and standards of quality to be maintained in such waters which are to be implemented from time to time by further regulations promulgated after public hearing defining the water or waters of this State to be assigned certain classifications and standards of quality to be maintained in such waters.

NEW JERSEY STATE DEPARTMENT OF HEALTH

Roscoe P. Kandle, M.D.
State Commissioner of Health

Filed with Secretary of State: August 10, 1964

Effective Date: September 1, 1964

(COPY)

REGULATIONS ESTABLISHING CERTAIN CLASSIFICATIONS TO BE ASSIGNED TO THE WATERS OF THIS STATE AND STANDARDS OF QUALITY TO BE MAINTAINED IN WATERS SO CLASSIFIED.

Fresh Waters

The fresh non-tidal surface waters of the State are herein classified as Classes FW-1, FW-2, FW-3 and FW-4. For each classification there follow definitions and stream quality criteria.

Class FW-1

Definition: Fresh surface waters designated by authorized State Agencies as being set aside for posterity to represent the natural aquatic environment and its associated biota.

Criteria

These waters shall be maintained, as to quality, in their natural state.

Class FW-2

Definition: Fresh surface waters approved as sources of public potable water supply. These waters are to be suitable for public potable water supply after such treatment as shall be required by the State Department of Health. These waters shall be suitable also for all recreational purposes including fishing, the propagation of native fish species desired for angling and other fish and aquatic life necessary thereto as well as any other reasonable uses.

Criteria

Conditions	Allowable Limits
1. Floating solids, settleable solids, oil, grease, artificial coloring matter and turbidity.	None of which are noticeable in the water or are deposited along the shore or on the aquatic substrata in quantities detrimental to the natural biota.
2. Toxic or deleterious substances (including mineral acids, caustic alkali, cyanides, heavy metals carbon dioxide, ammonia or ammonium compounds, chlorine, etc.)	None which would affect humans or be detrimental to the natural aquatic biota.

3. Odor and taste producing substances.	None which are offensive to humans, detrimental to the aquatic biota or capable of producing offensive tastes and/or odors in water supplies and fauna used for human consumption.
4. pH.	Between 6.5 and 8.5 unless naturally outside thereof.
5. Dissolved oxygen.	Not less than 5.0 p.p.m. for trout waters; otherwise 4.0 p.p.m.
6. Thermal discharges.	None which detrimentally affect the natural aquatic biota, or reasonably anticipated reuse of the waters.

Class FW-3

Definition: Fresh surface waters suitable for all purposes provided for under Class FW-2 except public potable water supply.

Criteria

Conditions	Allowable Limits
1. Floating solids, settleable solids, oil, grease and turbidity.	None which are noticeable in the water or are deposited along the shore or on the aquatic substrate in quantities detrimental to the natural biota.
2. Toxic or deleterious substances (including mineral acids, caustic alkali, cyanides, heavy metals, carbon dioxide, ammonia or ammonium compounds, chlorine, etc.).	None which would affect humans or be detrimental to the natural aquatic biota.

3. Color, odor and taste producing substances.	None which are offensive to humans, detrimental to the aquatic biota or capable of producing offensive tastes and/or odors in fauna used for human consumption.
4. pH.	Between 6.5 and 8.5 unless naturally outside thereof.
5. Dissolved oxygen.	Not less than 5.0 p.p.m. for trout waters; otherwise 4.0 p.p.m.
6. Thermal discharges.	None which detrimentally affect the natural aquatic biota, or reasonably anticipated reuse of the waters.

Class FW-4

Definition: Fresh surface waters except as provided for under Classes FW-1, FW-2, and FW-3. These waters are to have limited recreational value and ordinarily not be acceptable for bathing or fishing but shall be able to maintain some fish life even though they may not be suitable for the propagation of fish. These waters shall not be an odor nuisance and shall not cause damage to pleasure craft having occasion to traverse the waters.

Criteria

Conditions	Allowable Limits
1. Floating solids, settleable solids, oil and grease.	None which are noticeable in the water or contribute to the formation of sludge deposits along the shores.
2. Toxic and deleterious substances.	None in such concentrations as to cause fish mortality or inhibit their natural migration.

3. Taste and odor producing substances.	None which shall be offensive or that would detrimentally affect finfish, shellfish or other aquatic life in higher quality receiving waters. Neither shall it inhibit the natural migration of fish.
4. Dissolved oxygen.	Not less than 50% saturation.

Tidal Waters

The tidal surface waters of the State, including interstate waters, are herein classified as Classes TW-1, TW-2 and TW-3. For each classification there follow definitions and stream quality criteria.

Class TW-1

Definition: Tidal surface waters suitable for all recreational purposes, as a source of public potable water supply where permitted, and, where shellfishing is permitted, to be suitable for such purposes.

Criteria

Conditions	Allowable Limits
1. Floating solids, settleable solids, oil, grease, sleek and turbidity.	None which are noticeable in the water or are deposited along the shore or on the aquatic substrata in quantities detrimental to the natural biota.
2. Toxic or deleterious substances (including mineral acids, caustic alkali, cyanides, heavy metals, carbon dioxide, ammonia or ammonium compounds, chlorine, etc.).	None which would affect humans or be detrimental to the natural aquatic biota.

3. Color, odor and taste producing substances.	None which are offensive to humans, detrimental to the aquatic biota or capable of producing offensive tastes and/or odors in water supplies and fauna used for human consumption.
4. pH.	Between 6.5 and 8.5 unless naturally outside thereof.
5. Dissolved oxygen.	Not less than 50% of saturation.
6. Thermal discharges.	None which detrimentally affect the natural aquatic biota, or reasonably anticipated reuse of the waters.
7. Coliform bacteria.	The median MPN value in shellfish growing areas shall not be in excess of 70 per 100 milliliters.

CLASS TW-2 (As ammended and filed with Secretary of State January 5, 1966.
Effective date: March 1, 1966).

Definition: Tidal surface waters having limited recreational value and ordinarily not acceptable for bathing but suitable for fish survival although perhaps not suitable for fish propagation. These waters shall not be an odor nuisance and shall not cause damage to pleasure craft having occasion to traverse the waters.

Criteria

Conditions	Allowable Limits
1. Floating solids, oil and grease.	None which are noticeable in the water or contribute to the formation of sludge deposits along the shores.
2. Toxic and deleterious substances.	None in such concentrations as to cause fish mortality or inhibit their natural migration.

3. Taste and odor producing substances.	None, either alone or in combination, which are offensive or that would produce offensive tastes and/or odors in fauna used for human consumption.
4. pH.	Between 6.5 and 8.5 unless naturally outside thereof.
5. Dissolved oxygen.	Not less than 50% saturation.
6. Thermal discharges.	None which detrimentally affect reasonably anticipated reuse of the waters.

Class TW-3

Definition: Tidal surface waters used primarily for navigation, not recreation. These waters, although not expected to be used for fishing, shall provide for fish survival. These waters shall not be an odor nuisance and shall not cause damage to pleasure craft traversing them.

Criteria

Conditions	Allowable Limits
1. Floating solids, settleable solids, oil and grease.	None which are noticeable in the water or contribute to the formation of sludge deposits along the shores.
2. Toxic and deleterious substances.	None in such concentrations as to cause fish mortality or inhibit their natural migration.
3. Taste and odor producing substances.	None which shall be offensive or that would detrimentally affect finfish, shellfish or other aquatic life in higher quality waters.
4. pH.	Between 6.5 and 8.5 unless naturally outside thereof.
5. Dissolved oxygen.	Not less than 30% of saturation or 3.0 p.p.m., whichever is less.

Coastal Waters

The surf waters of the Atlantic Ocean are classified as Class CW-1.

Class CW-1

Definition: Ocean surf waters expected to be suitable for recreation use.

Criteria

Conditions	Allowable Limits
1. Floating solids, settleable solids, oil, grease and turbidity.	None of which are noticeable in the water or contribute to the formation of sludge deposits along the shores.
2. Toxic and deleterious substances.	None which would affect humans or be detrimental to the natural aquatic biota.
3. Color, taste and odor producing substances.	None which are offensive to humans, detrimental to aquatic biota or capable of producing offensive tastes and/or odors in fauna used for human consumption.

RULES AND REGULATIONS

* * *

The State Department of Health of the State of New Jersey, pursuant to the authority vested in it by Chapter 177, Laws of 1947, hereby amends that portion of Regulations Establishing Certain Classifications to be Assigned to the Waters of this State and Standards of Quality to be Maintained in Waters So Classified relating to Class FW-2, FW-4 and Coastal Waters filed with the Secretary of State on August 10, 1964.

STATE DEPARTMENT OF HEALTH OF THE STATE OF NEW JERSEY

Roscoe P. Kandle, M. D.
State Commissioner of Health

Effective Date: May 1, 1967

Filed with Secretary of State: March 6, 1967

Class FW-2

Definition: Fresh surface waters approved as sources of public potable water supply. These waters are to be suitable for public potable water supply after such treatment as shall be required by the State Department of Health. These waters shall be suitable also for all recreational purposes including fishing, the propagation and migration of native fish species desired for angling and other fish and aquatic life necessary thereto as well as any other reasonable uses.

Class FW-4

Repealed

Coastal Waters

The waters of the Atlantic Ocean within 1500 feet from mean low tide or to a depth of 15 feet, whichever is more distant from the mean low tide line, are classified as CW-1.

The waters of the Atlantic Ocean not included under Class. CW-1 are classified as CW-2, out to the three (3) mile limit.

Class. CW-1

Definition: Ocean waters expected to be suitable for all recreational purposes including fishing, the propagation and migration of native fish species desired for angling and other fish and aquatic life necessary thereto as well as any other reasonable use.

Criteria

Conditions	Allowable Limits
1. Floating solids, settleable solids, oil, grease and turbidity.	None of which are noticeable in the water or contribute to the formation of sludge deposits along the shores.
2. Toxic and deleterious substances.	None which would affect humans or be detrimental to the natural aquatic biota.
3. Color, taste and odor producing substances.	None which are offensive to humans, capable of producing offensive tastes and/or odors in fauna used for human consumption.
4. pH	Between 6.5 and 8.5 unless naturally outside thereof.
5. Dissolved Oxygen	Not less than 50% saturation.
6. Thermal Discharges	None which detrimentally affect the natural aquatic biota.

Class. CW-2

Definition: Ocean waters expected to be suitable for all recreational uses, including those in Class. CW-1, except bathing.

Criteria

Conditions	Allowable Limits
1. Floating solids, settleable solids, oil, grease and turbidity.	None of which are noticeable in the water or contribute to the formation of sludge deposits along the shores.

Conditions	**Allowable Limits**
2. Toxic and deleterious substances.	None which would affect humans or be detrimental to the natural aquatic biota.
3. Color	None which would impair the quality of CW-1 waters or detrimental to aquatic biota.
4. Taste and odor producing substances.	None which are offensive to humans, or capable of producing tastes and/or odors in fauna used for human consumption.
5. Dissolved Oxygen	Not less than 50% saturation.
6. Thermal Discharges	None which detrimentally affect the natural aquatic biota.

REGULATIONS CONCERNING CLASSIFICATION OF THE SURFACE WATERS OF THE ATLANTIC COASTAL PLAIN

WHEREAS, the State Department of Health of the State of New Jersey did promulgate "Regulations Establishing Certain Classifications to be Assigned to the Waters of this State and Standards of Quality to be Maintained in Waters so Qualified," effective September 1, 1964, and amended the said Regulations on January 5, 1966 and March 6, 1967, and

WHEREAS, in public hearings conducted by the State Department of Health on March 15, 22 and 29, 1967, classifications of the surface waters of the Atlantic Coastal Plain, as proposed by the State Department of Health, were presented to the general public, and

WHEREAS, the State Department of Health has given careful and thorough consideration to all statements submitted at said hearings, as well as statements and briefs submitted thereafter, relating to the proposed Classifications of the Surface Waters of the Atlantic Coastal Plain,

NOW, THEREFORE, the State Department of Health promulgates the following regulations entitled "Classification of the Surface Waters of the Atlantic Coastal Plain."

NEW JERSEY STATE DEPARTMENT OF HEALTH

Roscoe P. Kandle, M.D.
State Commissioner of Health

Filed with Secretary of State: April 27, 1967

Effective Date: May 24, 1967

CLASSIFICATION OF THE SURFACE WATERS OF THE ATLANTIC COASTAL PLAIN

Pursuant to authority vested in it under the provisions of Chapter 12, Title 58 of the Revised Statutes, the State Department of Health hereby promulgates the following classifications of the surface waters of the Atlantic Coastal Plain. Standards of Quality to be maintained in these waters as established by the State Department of Health are attached hereto.

I. Class FW-1

Waters having the ptential for this Class but which are not classified as such at this time may be recommended for such classification by public or private interests controlling the land area draining to the watercourse. Because of the restrictive-use nature of the FW-1 classification any waters thus designated must be contiguous with their source. Also, since the characteristics of surface waters are sometimes changed to the detriment of their natural biota by seemingly minor associations with domestic and/or agricultural activities, they must be inspected and approved before being classified. Requests for consideration in the classification of FW-1 waters should be directed to:

New Jersey State Department of Health
P.O. Box 1540
Trenton, N. J. 08625

A. FW-1 Manasquan River Drainage

Allaire State Park

1. That portion of the second southerly tributary of the Manasquan River west of Hospital Road situated wholly within the Allaire State Park boundaries.
2. The easterly tributary of the brook feeding Brisbane Lake located wholly within the Allaire State Park boundaries downstream to its confluence with the westerly tributary.

B. FW-1 Cedar Creek Drainage

Greenwood Forest Fish & Game Tract

1. Webbs Mill Branch and tributaries situated wholly within the Greenwood Forest boundaries.
2. Chamberlain's Branch and tributaries situated wholly within the Greenwood Forest boundaries upstream from the blueberry farm exception, also other tributaries to Chamberlain's Branch situated wholly within the Greenwood Forest Tract boundaries.

FW-1 Wading River Drainage

1. Westerly tributary to the Howardsville Cranberry Bog Reservoir and tributaries thereto situated wholly within the Greenwood Forest Tract boundaries.

C. FW-1 Barnegat Bay Drainage

Island Beach State Park

1. All the fresh water ponds on Island Beach State Park.

D. FW-1 Manahawkin Creek Drainage

1. Tommy's Branch from its headwaters downstream to the Bass River State Forest Recreation Area service road.
2. Falkenburg Branch of Lake Absegami from its headwaters downstream to the lake.

E. FW-1 Mullica River Drainage

Wharton Tract

1. Deep Run and tributaries thereto from its headwaters downstream to Springer's Brook.
2. Skit Branch from its headwaters downstream to its confluence with Robert's Branch.
3. Tulpehocken Creek and tributaries thereto from its origin downstream to its confluence with Featherbed Branch.
4. The westerly tributaries to Tulpehocken Creek and those natural ponds within the lands bounded by Hawkins Road, Hampton Gate Road, and Sandy Ridge Road.
5. Stream in the southeasterly corner of the Wharton Tract lying between Ridge Road and Seaf Weeks Road down to the Wharton Tract boundary.
6. Brook and tributaries between and immediately to the west of Tylertown and Crowleytown from its headwaters downstream to the head of tide at mean high water.
7. The easterly branches of the Batsto River from Batsto Village upstream to the confluence of Skits Branch.
8. Gun Branch from its headwaters downstream to U. S. Route 206.

NOTE: All boundaries referred to as they existed December 1966.

F. FW-1 Great Egg Harbor River Drainage

Tuckahoe Public Hunting and Fishing Grounds

1. Hawkin's Creek and the next adjacent tributary to the Great Egg Harbor River lying to the north from their origin downstream to where the influence of impounding occurs.

II. Class FW-2

A. Cranberry Brook and tributaries thereto upstream from the intake of the Monmouth Consolidated Water Company near the New York-Long Branch Railroad Crossing.

B. Shark River and tributaries thereto upstream from Remson's Mill Road.

C. Jumping Brook and tributaries thereto above intake of Monmouth Consolidated Water Company near Old Corlies Avenue.

D. Main stem of Manasquan River and tributaries thereto upstream from Garden State Parkway.

E. All fresh waters of the Plain, from Manasquan River to and including the Mullica River, upstream from the head of tide.

F. Absecon Creek and tributaries thereto upstream from Atlantic City Reservoir Dam in the City of Absecon.

G. Patcong Creek and tributaries thereto upstream from Patcong Lake Dam.

III. Class FW-3

A. Lake Takanassee

B. Poplar Brook

Deal Lake and tributaries thereto
Sunset Lake and " "
Lake Wesley and " "
Fletcher Lake and " "
Sylvan Lake and " "

C. Shark River and tributaries thereto downstream from Remson's Mill Road to head of tide.

D. Jumping Brook and tributaries thereto downstream from Old Corlies Avenue to head of tide.

E. Silver Lake and tributaries thereto
Lake Como " " "
Spring Lake " " "
Wreck Pond " " "

F. Fresh water reaches of main stem of Manasquan River and tributaries downstream from Garden State Parkway.

G. Absecon Creek and tributaries thereto downstream from above dam to head of tide.

H. Patcong Creek and tributaries thereto downstream from Patcong Lake dam to head of tide.

J. All other fresh waters of the Plain not delineated upstream from head of tide.

IV. Class TW-1

A. All tidal waters of Shark River and tributaries thereto from head of tide to surf waters.

B. All tidal waters of Jumping Brook and tributaries thereto downstream from head of tide to Shark River and to surf waters.

C. Tidal waters of main stem of Manasquan River and of tributaries thereto downstream from near the Garden State Parkway to surf waters.

D. All other tidal waters of the Plain downstream from the head of tide to surf waters.

V. Class CW-1

Ocean waters within 1,500 feet from mean low tide to a depth of 15 feet, whichever is more distant from the mean low tide line, from Sandy Hook to Cape May Point.

VI. Class CW-2

Ocean waters of the Plain not included under Class CW-1 out to the "three mile limit."

Filed with the Secretary of State: April 27, 1967

Effective Date: May 24, 1967

REGULATIONS CONCERNING TREATMENT OF WASTEWATERS, DOMESTIC AND INDUSTRIAL SEPARATELY OR IN COMBINATION, DISCHARGED INTO THE WATERS OF THE ATLANTIC COASTAL PLAIN, INCLUDING THE ATLANTIC OCEAN

WHEREAS, the State Department of Health is charged with the responsibility for the Water Pollution Control Program, including the approval of the designs of wastewater treatment facilities, in the State of New Jersey, and

WHEREAS, the citizens of this State, particularly the citizens in the Atlantic Coastal Plain, have been obliged in recent years to suffer repeatedly the consequences of serious oxygen depletion and other exemplifications of pollution in waters of the Atlantic Coastal Plain, said exemplifications of water pollution constituting threats to the public health, comfort or property of citizens of this State, and

WHEREAS, the State Department of Health did promulgate rules and regulations entitled "Regulations Establishing Certain Classifications to be Assigned to the Waters of this State and Standards of Quality to be Maintained in Waters so Classified," effective September 1, 1964, and amended said rules and regulations on January 5, 1966 and March 6, 1967, and

WHEREAS, the State Department of Health has concluded after extensive investigations and analyses of factual data that more intensive treatment of wastewaters must be provided throughout the Atlantic Coastal Plain in order to attain water quality specified by the aforesaid regulations of the Department, and

WHEREAS, the State Department is of the opinion that the attainment and maintenance of water quality in the Atlantic Coastal Plain as specified by the aforesaid regulations of the Department is necessary in order to abate a present threat to the public health, comfort or property of citizens of this State,

NOW, THEREFORE, the State Department of Health promulgates the following regulations entitled "Regulations Concerning Treatment of Wastewaters, Domestic and Industrial, Separately or in Combination, Discharged into the Waters of the Atlantic Coastal Plain, including the Atlantic Ocean."

NEW JERSEY STATE DEPARTMENT OF HEALTH

Filed with Secretary of State: May 1, 1967

Effective Date: June 1, 1967

REGULATIONS CONCERNING TREATMENT OF WASTEWATERS, DOMESTIC AND INDUSTRIAL SEPARATELY OR IN COMBINATION, DISCHARGED INTO THE WATERS OF THE ATLANTIC COASTAL PLAIN, INCLUDING THE ATLANTIC OCEAN

Pursuant to the authority vested in it under the provisions of Chapter 12, Title 58 of the Revised Statutes, the State Department of Health hereby promulgates the following regulations concerning treatment of wastewaters, domestic and industrial, separatel or in combination, discharged into the waters of the Atlantic Coastal Plain.

I. Henceforth, domestic wastes, separately or in combination with industrial wastes, prior to discharge into waters of the Atlantic Coastal Plain classified as FW-2 or FW-3 or TW-1, shall be treated to a degree providing, as a minimum, ninety-five percent (95%) of reduction of biochemical oxygen demand at all times including any four-hour period of a day when the strength of the wastes to be treated might be expected to exceed average conditions; it is an objective of this regulation that the biochemical oxygen demand of effluents discharged shall not exceed 15 parts per million.

II. Henceforth, industrial wastes, prior to discharge into waters of the Atlantic Coasta Plain, classified as FW-2, FW-3 or TW-1, shall be treated to a degree providing, as a minimum, ninety-five percent (95%) of reduction of biochemical oxygen demand at all times and such further reduction in biochemical oxygen demand as may be necessary to maintain receiving waters, after reasonable effluent dispersion, as specified in the rules and regulations entitled "Regulations Concerning Classification of the Surface Waters of the Atlantic Coastal Plain," effective May 24, 1967; it is an objective of this regulation that the biochemical oxygen demand of effluen discharged shall not exceed 15 parts per million.

III. Henceforth, domestic wastes, separately or in combination with industrial wastes, prior to discharge into waters of the Atlantic Coastal Plain classified as CW-1 or CW-2, shall be treated to a degree providing, as a minimum, eighty-five percent (85%) of reduction of biochemical oxygen demand at all times, including any four-hour period of a day when the average of the wastes to be treated might be expected to exceed average conditions; it is an objective of this regulation that the biochemic oxygen demand of effluents discharged shall not exceed 40 parts per million.

IV. Henceforth, industrial wastes prior to discharge into waters of the Atlantic Coasta Plain, classified as CW-1 or CW-2, shall be treated to a degree providing, as a minimum, eighty-five percent (85%) of reduction of biochemical oxygen demand at all times and such further reduction of biochemical oxygen demand as may be necessa in order to maintain the receiving waters in a quality as specified by the rules and regulations entitled "Classification of the Surface Waters of the Atlantic Coastal Plain," effective May 24, 1967.

V. It is recognized, especially in connection with some industrial wastes, that the pollution load imposed upon the waters of the Plain cannot be evaluated fully exclusively by the biochemical oxygen demand test; therefore, each industrial waste problem shall be considered individually and treatment shall be required as needed to effect compliance with the Water Quality Criteria established for the various classifications of waters in the Plain.

VI. Treatment standards set by these regulations are the minimum acceptable for the Atlantic Coastal Plain. Treatment more intensive than that specified hereinabove shall be provided whenever it is determined by the State Department of Health that such treatment is necessary.

Filed with Secretary of State: May 1, 1967

Effective Date: June 1, 1967

ROSCOE P. KANDLE, M.D., M.P.H.
State Commissioner of Health

RICHARD J. SULLIVAN, Director
Division of Clean Air and Water

State of New Jersey
DEPARTMENT OF HEALTH
JOHN FITCH PLAZA, P.O. BOX 1540, TRENTON, 08625

ORDER

WHEREAS, the State Department of Health of the State of New Jersey did promulgate "Regulations Establishing Certain Classifications to be Assigned to the Waters of this State and Standards of Quality to be Maintained in Waters so Classified," effective September 1, 1964 and amended the said regulations on January 5, 1966 and March 6, 1967, and

WHEREAS, the State Department of Health of the State of New Jersey did after public hearings conducted by the Department on March 15, 22 and 29, 1967 promulgate regulations entitled "Regulations Concerning Classification of the Surface Waters of the Atlantic Coastal Plain," effective May 24, 1967, and

WHEREAS, the State Department of Health of the State of New Jersey did promulgate regulations entitled "Regulations Concerning Treatment of Wastewaters, Domestic and Industrial Separately or in Combination, Discharged into the Waters of the Atlantic Coastal Plain, including the Atlantic Ocean," effective June 1, 1967, and

WHEREAS, the State Department of Health of the State of New Jersey has found through investigations made by its representatives that the sewage treatment plant owned and operated by the City of Pleasantville, in the County of Atlantic and the State of New Jersey, does not conform to the aforesaid regulations of the State Department of Health, and is inadequate in capacity or unit design to properly care for, treat and dispose of the sewage received therein before an effluent from the said sewage treatment plant is discharged into the waters of the Lakes Bay, being waters of the Atlantic Coastal Plain, being waters of this State, thereby causing or threatening injury to the inhabitants of this State either in their health, comfort or property, and

WHEREAS, the State Department of Health of the State of New Jersey, in consideration of the aforesaid, is of the opinion that in order for the sewage to be properly, adequately and sufficiently treated at the said sewage treatment plant before an effluent is discharged into the said waters of this State, the said sewage treatment plant must be altered, added to or improved in a manner approved by the State Department of Health, and

WHEREAS, it is incumbent upon the State Department of Health of the State of New Jersey to be specific as to the minimum degree of sewage treatment meeting the approval of the said State Department of Health, and a timetable of significant events including the contemplated dates for the completion of construction of sewage treatment projects,

THEREFORE, NOTICE IS HEREBY GIVEN by the State Department of Health of the State of New Jersey pursuant to R.S. 58:12-2 to the City of Pleasantville, in the County of Atlantic and the State of New Jersey, requiring that the said City of Pleasantville must and shall, prior to November 30, 1970, cease the discharge of improperly, inadequately and insufficiently treated sewage into the waters of the Lakes Bay being waters of the Atlantic Coastal Plain, being waters of this State, and must alter add to or improve the sewage treatment plant operated by the City of Pleasantville, including sewage treatment units designed to provide at all times a minimum of ninety-five percent (95%) reduction in biochemical oxygen demand of the sewage received at the said sewage treatment plant, the biochemical oxygen demand of the effluent of said plant not to exceed fifteen (15) parts per million, or, if in lieu of the discharge of the effluent to the Lakes Bay an effluent is to be discharged into the Atlantic Ocean, then the treatment units shall be designed to provide at all times a minimum of eighty-five percent (85%) reduction in biochemical oxygen demand of the sewage received at the said sewage treatment plant, the biochemical oxygen demand of the effluent of said plant not to exceed forty (40) parts per million, and including units for effective year around effluent disinfection, in order that the sewage received therein shall be cared for, treated and disposed of and the effluent discharged in a manner approved by the State Department of Health of the State of New Jersey, and in order that the treatment and disposal of said effluent shall meet the applicable standards of water quality described by regulations of the State Department of Health entitled "Regulations Concerning Classification of the Surface Waters of the Atlantic Coastal Plain," effective May 24, 1967, and, the regulations of the State Department of Health entitled "Regulations Concerning Treatment of Wastewaters, Domestic and Industrial Separately or in Combination, Discharged into the Waters of the Atlantic Coastal Plain, Including the Atlantic Ocean," effective June 1, 1967, and in effecting abatement of pollution of the waters of this State within the time hereinabove provided shall execute the following work performance schedule:

(1) Complete an engineering report upon the proposed basis of design of additions and alterations with review and approval of same by the State Department of Health on or before April 30, 1968;

(2) Complete preparation of and secure review and approval of preliminary engineering plans on or before October 30, 1968;

(3) Complete preparation of and secure review and approval of detailed contract plans and specifications on or before June 1, 1969;

(4) Award construction contracts on or before October 1, 1969;

(5) Complete construction on or before November 30, 1970;

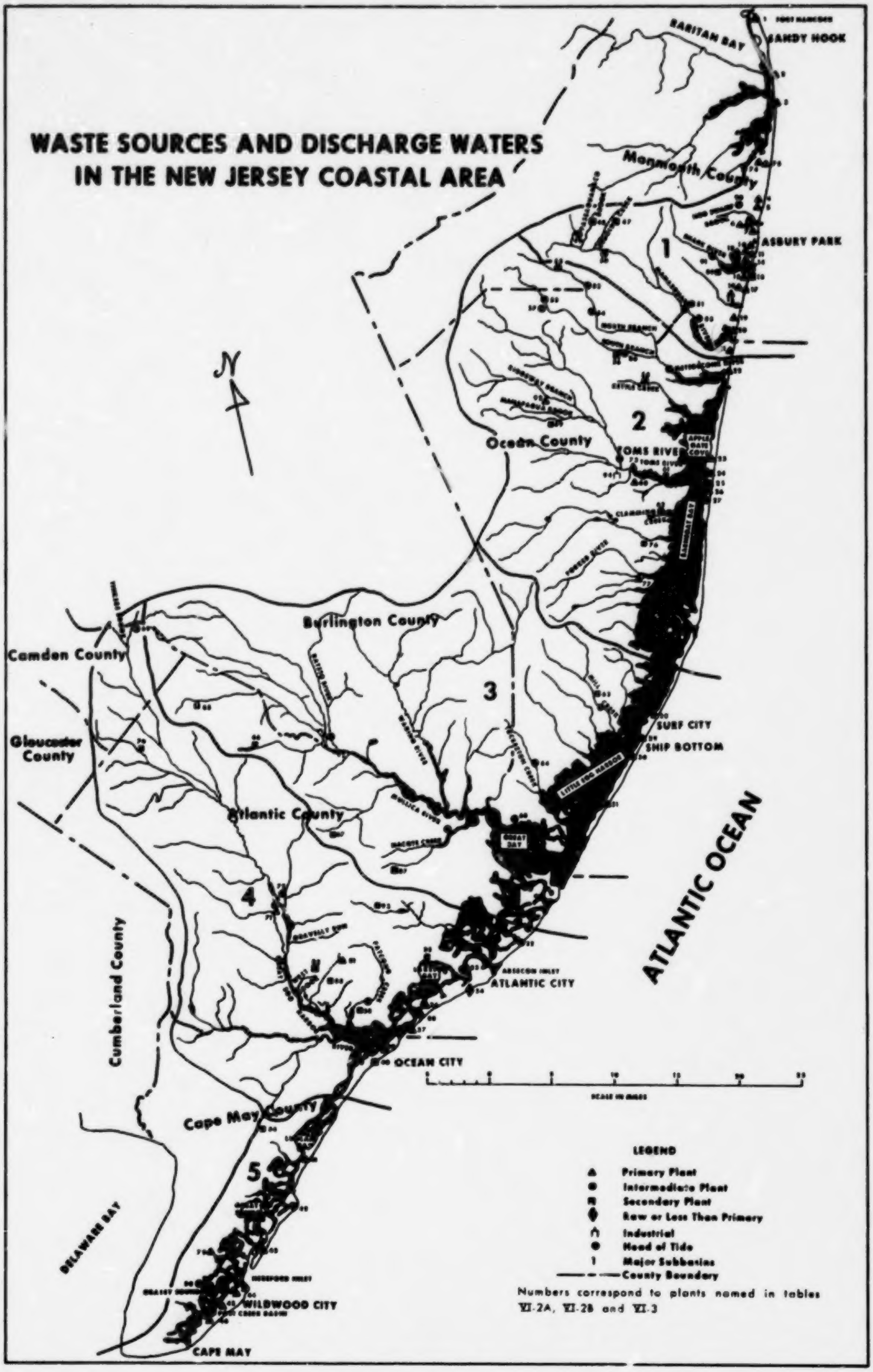
(6) The work performance scheduled herein shall be in conformity with the master engineering plan for sewerage services in the County of Atlantic as approved by the New Jersey State Department of Health and the design of any ocean outfall sewer shall be in conformity with a feasibility study and report upon the design of such ocean outfalls along the coast of Atlantic County as approved by the New Jersey State Department of Health.

STATE DEPARTMENT OF HEALTH OF THE STATE OF NEW JERSEY

Richard J Sullivan

Richard J. Sullivan, Director
Division of Clean Air and Water

Dated: June 16, 1967



WASTE SOURCES AND DISCHARGE WATERS IN THE NEW JERSEY COASTAL AREA

RARITAN BAY
SANDY HOOK
Monmouth County
ASBURY PARK
1
2
3
4
5
N
Ocean County
TOMS RIVER
SURF CITY
SHIP BOTTOM
LITTLE EGG HARBOR
GREAT BAY
Burlington County
Camden County
Gloucester County
Atlantic County
Cumberland County
ABSECON INLET
ATLANTIC CITY
OCEAN CITY
Cape May County
DELAWARE BAY
HEREFORD INLET
WILDWOOD CITY
CAPE MAY
ATLANTIC OCEAN
SCALE IN MILES
0
5
10
15
20
25
LEGEND
▲ Primary Plant
● Intermediate Plant
Secondary Plant
◆ Raw or Less Than Primary
∩ Industrial
● Head of Tide
1 Major Subbasins
— - — County Boundary
Numbers correspond to plants named in tables VI-2A, VI-2B and VI-3